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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

ELECTRO-PLATERS REVIEW

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THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW

Vol. 17 NEW YORK, MARCH, 1919 No. 3

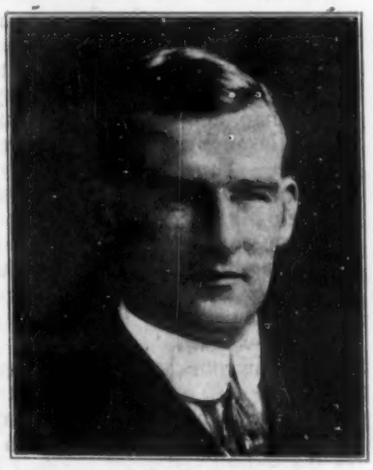
NATIONAL MEETING OF METAL MEN

THE INSTITUTE OF METALS SECTION OF THE AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS HOLDS ITS FIRST NEW YORK MEETING, FEBRUARY 17, 1919.

That the affiliation of the American Institute of Metals with the American Institute of Mining Engineers, now the American Institute of Mining and Metallurgical Engineers, was a step in the right direction as far as the scientific study of the metals is concerned, was well proven by the attendance at the first New York meeting held on February 17, 1919. During the life of the Institute of Metals there never had been held a meeting with so large an attendance or one with such a scientific atmosphere. The first session of the meeting was held on Monday morning at the United Engineering Societies Building with Chairman W. M. Corse in the chair. The paper on DIE CASTINGS AND THEIR APPLICATION TO WAR WORK, by Charles Pack, as published in THE METAL INDUSTRY for February, was read by title.

W. M. CORSE.
Chairman.

F. L. WOLF,
Secretary.



W. B. PRICE,
Senior Vice-Chairman.

Dr. Zay Jeffries, chief of the research department of the Aluminum Castings Company, Cleveland, Ohio, gave a masterly presentation of his paper on EFFECT OF TEMPERATURE, DEFORMATION AND GRAIN SIZE ON THE MECHANICAL PROPERTIES OF METALS. Dr. Jeffries put forth some convincing arguments in favor of the amorphous theory of the structure of metals, and he said he believed that Le Chatelier, Tamman and Heyn, at present the ablest opponents of the amorphous theory, will not be able longer to continue their beliefs that surface tension alone can account for all the observed variation in the properties of single constituent metals. During the discussion that followed Dr. Jeffries' address, Dr. P. D. Merica of the Bureau of Standards, stated that he differed in belief with Dr. Jeffries in some points, and he submitted a written discussion to this effect. Dr. Mathewson of Yale College also differed with Dr. Jeffries and submitted a written discussion.

Professor J. W. Richards presented a paper on AUTOMATIC COPPER PLATING which aroused considerable interest. This paper was published in THE METAL INDUSTRY for February, 1919. Briefly, the process is as follows: The plating metal is applied to the sheet in the form of a liquid mixture by means of rolls, such as inking rolls. The sheet, after being coated with the mixture is automatically carried forward and deposited on a link belt conveyor which carries it through a furnace maintained at a temperature well above that of molten copper. The basic principle involved lies in the application of the plating metal to the sheet while the sheet is cold and then melting the metal in place on the sheet under conditions which are favorable to the formation of the plating. Dr. Richards had a sample of the work done by the automatic plating process described in the paper. This was a sheet of copper plate. While

the plate, which was coated with copper on both sides, was of a burnished appearance, he stated that when it came from the machine it was dark in color, and had been given a light dip in sulphuric acid, and then automatically brushed to produce the luster. The object of the plating process, he said, was to provide a coating for iron which is cheaper than tin.

OTHER COPPER PLATING PROCESSES

In discussing this paper, Alexander Silverman, head of the School of Chemistry, University of Pittsburgh, briefly mentioned similar plating processes, among them the copper coating of steel by hydraulic pressure, described by J. O. Handy, Pittsburgh Testing Laboratories, in an address before the American Chemical Society some years ago, and a recently devised method in accordance with which molten copper is poured around redhot steel forms, then hot rolled, cold rolled and cold drawn. This copper-coated steel was used by the United States Government for the noses of shells, and these were found to have twice the penetrating power of ordinary copper-nose shells. The proportion of copper and steel in these noses was 30 per cent of the former to 70 per cent of the latter, one-half of the copper coating being on the exterior and the other half on the interior. Just before the armistice was signed the Government awarded a contract for shells of this type totalling $3,300,000, but this was later cancelled. Unlike copper-nickel plated steel, copper plate coated by means of this process requires no annealing when it is worked up into a finished product. It has been also found that copper or brass-coated plate of this kind can be drawn to the very finest wire. For instance, wire five-thousandths of an inch in diameter has been drawn from an 8-in. billet. Copper-coated screen is also produced, as are plated steel springs. Springs with a 30 per cent copper coating can be tempered as readily as without a coating. This plating process is used by the Copper Clad Steel Company, Rankin, Pa., said Mr. Silverman, and he exhibited a number of samples.

A large number of patents were taken out in the United States during the years 1907, '08 and '09, by James F. Monett and assigned to the Duplex Metals Company, of Chester, Pa. These patents and some of the processes were described in THE METAL INDUSTRY for those years. The business is now being carried on as Mr. Silverman stated by the Copper Clad Steel Company, of Pittsburgh, Pa., under the name of "Copper-weld."

S. Skawronski read his paper on VOLATILIZATION OF CUPROUS CHLORIDE ON MELTING COPPER CONTAINING CHLORIDE in a very forceful way and most emphatically declared that copper was lost in the melting process due to the volatilization of cuprous chloride. There was no discussion on this paper.

A paper, A COMPARISON OF GRAIN SIZE MEASUREMENTS AND BRINELL HARDNESS OF CARTRIDGE BRASS, which linked up nicely with Dr. Jeffries' address was presented in abstract by W. H. Bassett and evolved some discussion. The paper was illustrated with some thirty-six micrographs, but due to lack of time these were not shown.

AFTERNOON SESSION

The session held in the afternoon with Senior-Vice-President W. B. Price in the chair was enlivened by the presentation of the paper by P. E. McKinney, chemist and metallurgist of the Naval Gun Factory United States Navy Yard, Washington, D. C., on MANGANESE BRONZE which was published in THE METAL INDUSTRY for February. This paper came somewhat as a bomb shell, as it upset some cherished ideas regarding the manufacture of manganese bronze. Some representatives of bronze producing companies who were present were not entirely prepared to become reconciled to Mr. McKinney's methods. Some of them stated that their practice had convinced them that manganese bronze to fully meet all tests should be made with the utmost care and of the best raw materials. The idea of making it in a reverberatory furnace and from unpure scrap did not appeal to them as good practice. After several of the metallurgists had stated their views and given what they considered valid objections to the method Mr. McKinney clinched the matter by stating that he had made this bronze in this way for two years, had made about 1,000,000 pounds last year, a large portion of it being in large castings, some weighing as much as nine tons, and every bit of it had met all tests required. He exhibited some very interesting test bars made from both castings and from coupons cast on castings. A major and a captain from the ordnance department substantiated Mr. McKinney's statements as to the excellence and strength of the material.

The paper by J. Alexander on METALS AND ALLOYS FROM A COLLOID-CHEMICAL VIEWPOINT, in which he suggested a colloidal condition of alloys and compared them to soaps or jellies, was discussed in a humorous vein in a written communication from Professor W. D. Bancroft of Cornell University.

The last paper of the meeting was read by title and questions regarding the subject were answered by the author, Miss Lillian Erskine of Newark, N. J. This paper was STANDARDS FOR BRASS AND BRONZE FOUNDRIES AND METAL FINISHING PROCESSES, and is published in this issue of THE METAL INDUSTRY.

During the meeting it was announced that the name of the American Institute of Mining Engineers had been changed by the vote of the members to the American Institute of Mining and Metallurgical Engineers. The president for the years 1919 and 1920 is Horace V. Winchell, a well known economist, geologist and mining engineer.

CRUCIBLES.

The stocks of finished graphite crucibles in the United States, as reported by the Census Bureau on October 1, 1918, were as follows:

Owned by	On hand and in transit.	In use.	Estimated annual requirements.
Manufacturers of crucibles	310,753	....	....
Users of crucibles for work in—			
Steel	72,552	8,626	678,904
Brass, bronze and aluminum	178,470	14,658	1,058,958
Babbitt metal and solder	1,340	64	6,156
Miscellaneous	20,002	1,985	46,930
Total	583,117	25,333	1,790,138

It will be seen that even under war conditions the supply of crucibles of all sizes amounted to one-third of the estimated annual consumption. For the smaller sizes, up to No. 45, the total stocks were 111,886 and the estimated annual requirements only 83,841.

With the stoppage of the war demand for crucible steel and the nonferrous alloys it is clear that the requirements for 1919 will be much less than those given in the above estimate. Moreover, the increase in the use of the electric furnace will tend to decrease further the demand for crucibles and consequently the demand for graphite of crucible grade.

STANDARDS FOR BRASS AND BRONZE FOUNDRIES AND METAL FINISHING PROCESSES*

A PAPER PRESENTED AT THE NEW YORK MEETING OF THE AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, FEBRUARY 17-20, 1919.

BY LILLIAN ERSKINE,† NEWARK, N. J.

While brass and other copper alloys have long been listed as offering health hazards to their workers, it is questionable if the metals involved are alone responsible for the trades' records of morbidity. The entire science of foundry sanitation is the product of the past two decades; and the best standards now operative would have been regarded as little short of revolutionary prior to 1910.

The special handicap to the conservation of the health of the brass founder's employees has been the fact that, unlike the iron founder, his business could be profitably carried on in almost any small and unsanitary quarters. As a result, writers on occupational disease have accepted brass chills or brass founders' ague as an inevitable feature of the trade; and respiratory disabilities, as well as phthisis and disturbances of the nervous system, are also included as prevalent among those employed.

While there can be no question as to the basic accuracy of past investigations, there is every reason to doubt the necessity for an undue percentage of ill health among brass molders and casters who are safeguarded by scientific ventilating standards and by improving personal habits of sobriety. There is, however, need for a campaign of education as to the most approved practices and equipment whereby the employer may safeguard the health of his workers, and thereby reduce his labor turnover and increase his productive efficiency.

Broadly speaking, copper, tin and aluminum carry negligible health hazards. The toxic qualities of lead, however, are a menace; especially if scrap lead is recovered or bought for foundry processes. The rapid volatilization of zinc renders its fumes and flocculent condensation the chief problems in conserving the health of the brass worker. The frequent presence in the foundry air of traces of arsenic compounds, lead oxides, carbon monoxide, oil fumes and occasional mineral acid and alkali vapors, from cleansing and dipping processes, emphasizes the need for free natural or mechanical ventilation.

On the storage and transportation methods of the metals needed in furnace processes depends, to a great extent, the amount of dust in the air. Where scrap lead is used, the poisonous dust accumulating in bins, or scattered during transportation, constitutes a hazard.

The use of stick phosphorus, instead of a phosphor-copper or phosphor-tin, as a scavenger in bronze is now practised in the small foundry only for economic reasons. Special instruction and warning as to its highly poisonous character and combustion-hazards are necessary in the case of new employees.

FOUNDRY CONSTRUCTION.

In foundry construction light and ventilation are the prime requisites. The English requirement of 2,500 cu. ft. (70 cu. m.) of air per brass worker engaged in sand foundry casting and of 3,500 cu. ft. (99 cu. m.) per worker in rolling-mill casting (or similar shops where continuous pouring is practised in foundries devoid of mechanical ventilation) is a reasonable standard for structural dimensions.

The mere provision of air space, however, is no guarantee of satisfactory productive and health standards. Adequate lighting calls for the provision of window and skylight area on a basis of 40 per cent. of the floor area, provided these are properly located and cleaned at least monthly. Fume and dust generally decrease the average of natural foundry illumination at the rate of 0.125 to 0.25 per cent. daily. While the height of the side walls should be governed by the size of the foundry, a minimum of 15 feet is essential for free natural ventilation.

Batteries of pivot center-hung windows satisfactorily meet the requirements of both ventilation and light. Illumination may be intensified by the substitution of wire glass for sections of the usual tight-construction roof of the monitor or side bays. Flat wire-glass skylights (hinged at the upper end to permit of their partial raising) will provide additional light and ventilation. The "hot-house" glass type of foundry construction, however, involves excessive sun exposure during 8 months of the year. Sawtooth roof construction gives admirable lighting; but does not ensure satisfactory removal of fume and heat.

Since a southern exposure offers excess sunlight on the molding floor, it is well to install offices, core rooms, etc., on the south side of the building, leaving the west, north and east walls free for lighting and ventilation of founding processes.

In sand-casting operations, the ingress of fresh air must be provided by windows; preferably pivot center-hung, and operated in batteries. As too strong a draft of air may develop spills, during the cold months all doors should be vestibuled except in the melting department, and there also should be a convenient method of floor control over window openings.

In continuous pouring processes there should be a liberal provision of side doors, as well as horizontally or vertically pivoted windows. There should be an upward sweep of air from or near the level of the floor; no disadvantage to the product from chilling need be feared.

ROOF VENTILATION.

While the new type of inverted center peak roof gives exceptionally satisfactory results, the monitor type is still universally accepted as the standard. The angle of the roof peak should not fall far below 30°, as the upward rush of fume is easily checked and deflected by flattening the apex. The width of a monitor should be at least 15 per cent. of that of the building and 20 per cent. is better, as a wider monitor gives better lighting facilities. In a monitor having a greater width than 20 per cent. there is a probability of the chilling and backing of zinc fumes. The height of the side walls of the monitor should never fall below 4 ft. (1.2 m.) when open slat louvers run its entire length.

Pivot center-hung windows when installed, should run the length of the monitor and be at least 3 feet in height, operated from the floor, and so swung through an arc of 90° that they may be kept in a horizontal position in clear weather, thereby creating a continuous draft through the monitor and preventing a downward current of chilled air.

Ordinarily, the monitor runs the full length of the

* Prepared for Lewis T. Bryant, Commissioner of Labor of the State of New Jersey.

† Investigator of Occupational Diseases for the New Jersey Bureau of Hygiene and Sanitation, John Roach, Chief.

building; but a type of cross-monitor construction, above cross batteries of pit furnaces and flasks, has been successful in preventing zinc fumes from being driven in the faces of casters to leeward of the prevailing air currents.

However satisfactory a liberal provision of the cowl or syphon type of natural-draft ventilator may have proved for general foundry conditions, the evolution of zinc fume in the pouring of yellow brass requires a freer roof ventilation than can be provided by any of the present models. This does not apply to individual installations over batteries of open-flame tilt furnaces, which are noted later.

FURNACES AND HOODS.

The pit crucible variety of furnace has long been the standard type for the brass and bronze industries. Open-flame oil and gas-fired furnaces, however, are now being used. The chief hygienic advantages of the pit crucible are: The initial melting fumes are almost invariably removed by the requisite chimney or stack draft. In tight-roof foundries mechanically ventilated hoods can be constructed above the batteries of fires, ensuring the safeguarding of the worker during incidental charging and skimming processes. The brass (usually yellow and carrying a high percentage of zinc) is poured direct from the melting crucible, thus eliminating the double fume exposure called for in tilt furnace processes. The chief disadvantage of the pit furnace is the radiation of excessive heat. This may be overcome by a basement construction, which leaves at least a 6-foot passageway (ventilated by flues or windows direct to the outer air) in front of the battery of fires. Ashes can be removed through this basement and the danger of a slow melt, from starved drafts dependent on working-floor conditions, is avoided.

STACKS.

The question of adequate drafts for the pit furnace is governed by the diameter and height of the chimney and the number of fires it is designed to carry. Five fires or less call for a minimum stack diameter of 18 inches; thirty fires require a minimum diameter of 38 inches, and forty fires require a minimum of 45 inches. Generally speaking, the height of the stack should be from twenty or twenty-five times the diameter; but adjacent buildings may make it necessary to increase these figures. The chilling of ascending heated currents of air by excessive height, however, is often responsible for the backing up of irritating and injurious fumes.

The chilling of ascending air currents is a greater handicap in the metal stack than the brick chimney. If preheating is necessary, it may be accomplished by introducing steam through a cock situated near the base or by burning wood to induce an up-draft before the actual fire is laid. The jacketing of an unlined metal stack by means of an outer shell, allowing about 2 inches of air space between it and the circumference, will prevent chilling and backing of fumes. A firebrick lining accomplishes the same result.

HOODS.

In old-type foundries, the installation of a ventilated metal hood over the pit fires is a safeguard against incidental fumes and excessive heat. The area of the hood should equal the area occupied by the battery of fires and the pit and its lower edge should not be more than 6 feet 3 inches above the floor level. Straight, natural-draft stacks direct to the outer air, not less than 24 inches in diameter, and in a proportion of one to every 10 feet of hood length, may be preferably employed. If, for structural reasons, the ventilating stack leads to the main furnace stack, elbows should be avoided; and the ventilating stack should enter the furnace stack at an angle of not more than 45°. Fans and a standard pipe system are requisite when free roof ventilation cannot be secured or the location of the main stack does not permit of satisfactory connection.

Where the battery of pit fires is located against an outer wall, center-hung windows, in a proportion of one to every five fires should be provided. Since air currents always short-circuit along the lines of least resistance, free window ventilation or excess pull on a ventilating hood may hinder the pit-draft and a slow melt result. This may be prevented by the basement type of construction already noted; or by pit flues leading direct to the outer air. A pit 6 feet deep by 7 feet wide ensures freedom from the effects of short-circuiting.

GRATINGS.

Grating bars should be set in the frame and not cast, thereby avoiding warping and accident hazards. Metal plates with staggered perforations may be used; but care must be taken against starving the pit draft by too scant provision of openings, unless special flues are provided. In continuous casting shops, the old-fashioned movable oak plank (in spite of accident risk) is frequently employed. The basement corridor construction permits a tight metal working floor, as the problem of excess heat is practically eliminated and all ashes are removed from below.

GAS AND OIL-FED FURNACES.

The open-flame oil furnace always requires hooding and direct stack ventilation to the outer air. When the roof construction prohibits natural draft, a deep hood and direct fan pull, upobstructed by elbows, is essential for the removal of fume and heat. The practical separation, by means of hooding or partial partition of the melting from the pouring process is of unquestioned advantage.

On a 60-inch open-flame oil furnace, the angled, oblong bell of the hood should be at least 10 feet long by 5 feet 6 inches wide and installed at a height of not more than 6 feet 6 inches above floor level. On a 24-inch furnace, the hood should be at least 6 feet 6 inches long by 40 inches wide. When ordinary sheet iron is employed, the limited area upon which the direct flame impinges should be reinforced by an inner skin preferably of 3/16-inch steel, which can be easily renewed, thereby conserving the life of the hood.

The single stack on the hood of a 42-inch open-flame oil furnace should be at least 30 inches in diameter; for the hood of a 60-inch open-flame oil-furnace, the 36-inch stack is required. Where a double stack is installed over a 60-inch furnace, each stack should be at least 22 inches in diameter. A height, over all, of from six to eight times the diameter of the stack is sufficient, unless adjoining buildings make an increased height necessary. Since the danger points from brass fumes in skimming and initial pouring are located within the area protected by the hood, its size and ventilating capacity are of importance.

The same standards apply to tilt furnaces in the bronze foundry; where the less obvious hazard of arsenic fumes and products of combustion may prove a health menace.

Where a battery of Rockwell furnaces is located against an outer wall, a hood or metal curtain should be dropped from the roof over and in front of the line to within 6 feet 6 inches of the working platform. Center-hung windows, in a proportion of one to each furnace should be provided in addition to natural draft or revolving ventilating hoods direct to the outer air. If the wall can only be opened up near the eaves, wall fans

may be installed. Where a dead wall exists but roof ventilation is possible, the hooded area should be provided with revolving ventilating hoods of an approved type, direct to the outer air. These should be in a proportion of one to every two furnaces and have a minimum diameter of 48 inches. Where natural-draft stacks are employed, the same diameter is needed and a minimum height over all of six to eight times the diameter.

Where a battery of furnaces is located in or near the center of the workroom, a hood at least 10 feet wide by 8 feet high should be installed above the entire line, and dropped to within 6 feet 6 inches of the floor. The ventilating provisions should be identical with those just described.

VENTILATING SYSTEM.

For satisfactory mechanical ventilation of the tight-roof foundry, the cubic contents of the space from which air must be removed, as well as the frequency of change called for, should be scientifically computed. By installing a well-designed pipe system, with its branched openings dropped to within 3 feet of the floor and connected to a housed fan, a steady change of air every few minutes can be maintained at a low expense of upkeep. Almost any of the numerous bladed types of exhaust fans may be used; but, generally speaking, the smaller the fan unit, the greater is the total horsepower expended for the given change of air.

In handling 6,000 cu. ft. of air in a typical cellar foundry 20 by 30 by 10 feet, Table 1 may be taken as a guide. This table shows the relative costliness of upkeep, in horsepower expended, for a small fan installation. Even when driven at the higher speeds, the skin friction developed in too small a pipe makes the seeming initial economy an ultimate financial handicap. A No. 3 fan handles but 4,040 cu. ft. of air per minute, with 2.48 horsepower, through a pipe having an area of approximately 1.5 sq. ft., and at a velocity of some 2,666 feet per minute. A No. 6 fan easily handles 5,970 cu. ft. per minute, with less than ½ horsepower, through a pipe having an area of about 6.2 sq. ft., with a velocity of approximately 962 feet per minute.

TABLE 1.—Ventilation Data for Small Cellar Foundry.

Number of Exhaust Fan.	Diameter of Exhauster Inlet, Inches.	Horsepower Required.	Cubic Feet of Air per Minute Delivered by Exhauster.
3	17¼	2.48	4040
3½	20	3.85	5750
4	22¾	2.24	5740
4½	25¾	1.71	6130
5	28½	0.98	5870
5½	31½	0.65	5800
6	34¼	0.50	5970

Table 2 may be used to determine the size of the exhauster that will most economically provide the air change that healthful working conditions demand: In the case of a typical old-type foundry 20 by 30 by 10 feet containing 6,000 cu. ft. of air, a No. 3 exhaust fan using but 0.13 horsepower will give an approximately complete air change every 4 minutes. This 4-minute change is a safe minimum standard for a tight-roof foundry, provided local skimming-hood protection is provided in addition.

TABLE 2.—Exhaust Fan Data.

Number of Exhaust Fan.	Diameter of Exhauster Inlet, Inches.	Horsepower Required.	Cubic Feet of Air per Minute Delivered by Exhauster.
3	17¼	0.13	1490
3½	20	0.17	2030
4	22¾	0.22	2650
4½	25¾	0.28	3360
5	28½	0.35	4150
5½	31½	0.42	5020
6	34¼	0.50	5970

The various fittings and accessories must conform to the standards of the New Jersey Bureau of Hygiene and Sanitation.

LOCAL SKIMMING HOODS AND WORKING PLATFORMS

Yellow brass foundries should install local exhaust hoods for the removal of skimming fumes; these are connected to the main exhaust system and are usually dropped beside the brick or iron supports of the bays. A 14-inch pipe, flaring to a 24-inch hood at a point 3 feet above the ground, the back of the hood being dropped to the floor level, leaving a projecting half moon above the crucible, gives the best results. An air velocity of 3,000 lin. ft. per minute should be maintained.

The bars of working platform of stationary furnaces should be inset, not cast in the frame. No solid metal plates should be used, because of radiated heat.

SPECIFICATIONS FOR EXHAUST SYSTEMS.

The faulty construction of blower systems, due to lack of specific engineering standards, is the greatest handicap to satisfactory fume, heat, and dust removal in the foundry. The questions of material and the scientific coordination of all details that will aid the flow of air generated, without increasing the cost of operation, must be fully understood to insure satisfactory results. Standard specifications are provided by the New Jersey Bureau of Hygiene and Sanitation.

FOUNDRY HEATING.

The question of equalizing extremes of temperature by means of a mechanical heating and ventilating system is of prime importance to the employee and the employer in the larger sand-casting foundry. Few industrial health hazards are more depressing to vitality or more psychologically and physically conducive to intemperance than the damp chill of the unheated foundry. The prevalence of rheumatism and respiratory diseases among molders and casters is in some measure due to lack of dressing-room and washing facilities; but the prime cause for molders is the blanket of moisture-laden air above the damp molding floor of the one-shift plant, the temperature of which is not sufficiently raised to ensure evaporation until pouring takes place, and then only to a localized degree.

The best modern heating practice relies on a forced system of warm air diffusion by means of a housed fan and pipes. The fresh-air supply is drawn from the outside over a bank of steam coils, put through the fan, and then delivered through ducts to various points within a few feet of the floor level. By this means the coldest foundry may be heated in zero weather within from ½ hour to 1 hour, the cold air in the foundry being rapidly displaced by the volume of heated outside air circulated by the fan. During preliminary heating the fan can be speeded to its maximum delivery; but as soon as a sufficient temperature has been reached, its normal speed can be resumed and maintained.

In addition to the advantage of placing the heated air at practically the floor level, this method permits thermostat control. By this means the amount of steam supplied through the heating coils can be automatically regulated; so that the temperature can be kept within 2° of the desired standard (55°) regardless of the outdoor temperature or the negligence or whims of any

person. The necessity for guarding against the freezing of the molding sands dictates the maintenance of a safe minimum temperature at all hours during extreme weather.

ARTIFICIAL LIGHTING.

Foundry work is generally reckoned (in standard lighting codes) as requiring from 2 to 4 foot-candles. Whenever, owing to weather conditions or structural defects, natural light falls below this intensity, artificial lighting must be used and may be roughly reckoned, with a good overhead system, on a basis that 1 foot-candle (spherical) per square foot of floor area will produce an illumination of about 3 foot-candles. A code of lighting has been prepared by the Bureau of Electrical Equipment, New Jersey Department of Labor.

The advantages of a good modern tungsten-lamp equipment in the foundry are: increased production; greater accuracy in workmanship; reduced accident hazard; reduction of eye strain, reduction of labor turnover due to more cheerful surroundings, lessening of fatigue and shop friction, promotion of good housekeeping, and improved facilities for superintendence and inspection. Owing to prevailing smoke and dust exposure, the lighting equipment deteriorates at the rate of 0.0625 to 0.25 per cent daily. As in the case of windows and skylights, a regular follow-up system of cleaning should be maintained.

FLOORS AND GANGWAYS.

The value of materials handled in the brass and bronze foundry does not permit a sand molding floor; cement is more popular than brick with the workers, and metal-plate gangways are frequently adopted. Belgian brick makes a satisfactory molding floor. A layer of sand insulates the brick against incidental hazard from molten metal, and the sand can be easily collected and renewed when its periodical recovery-treatment for valuable content becomes necessary.

To avoid accident, it is essential to guard against excess moisture on all cement and metal-plate surfaces; and to set a minimum standard of 5 ft. for all main gangways along which the ladles must travel.

FLASK RACKS.

Where small sized standard products are habitually handled, the use of rows of fixed metal racks, or horses, upon which the flasks may be laid before pouring, conserves the physical efficiency of the molder, by the resulting saving in foot-pounds of energy ordinarily expended in stooping to the flow-level.

PATTERN SHOP.

All dust and refuse material produced by woodworking machinery in the pattern shop should be removed by an exhaust system, constructed in accordance with standard specifications, and provided with a device for injecting steam into the pipes to extinguish any blaze. Not only the conservation of health, but lessening of fire hazards dictate such an installation. (See Standards of the New Jersey Bureau of Hygiene and Sanitation.)

CORE OVENS.

No type of oven, whether of the drawer or revolving-table variety, is always fume-tight during filling and discharging operations. Even though the oven is equipped with reasonably effective exhaust ventilation, a mechanically ventilated hood should be installed above the working doors. The hood should be of the same width as the core oven; and where only one set of doors or drawers is used, may be of the half-moon type overhanging the side where fumes are detected. A 5-in. ventilating pipe through which an air velocity of 1000 lin. ft. per min. is maintained is sufficient to care for every 5 ft. of oven width.

Where the core ovens are installed in a double-ended battery, worked on both sides, a hood should be suspended over the entire installation and mechanically ventilated by means of 5-in. pipes in the proportion of one to every 25 sq. ft. of hood. If natural-draft ventilation is relied upon, the ventilating pipe should run direct to the outer air, or enter an adjacent stack at an angle not to exceed 45°. The diameter of such a pipe should be at least 14 in. to every 25 sq. ft. of hood area.

TUMBLING BARRELS.

All barrels should be equipped with exhaust pipes of the proper proportions. A minimum diameter of 4 in. is essential, and the suction generated may vary from 1 to 2 in. (static method) according to the character of the dust.

BUFFING, POLISHING AND GRINDING.

All dust generated in the process of buffing, polishing and grinding should be removed by an exhaust system constructed in accordance with the details given in Table 3. A satisfactory balance must be maintained between the air exhausted and the supply admitted to take its place. Ingress openings should be at least three times the area of the egress openings. If evenly distributed, and if the air is admitted over warm steam coils in winter, a fairly draftless ventilating system can be maintained. Wheels of a special type may require larger pipe sizes than those indicated. (See Standards New Jersey Dept. of Labor.) Steel safety hoods or some other approved safety device should be installed on solid grinding wheels.

All emery belts should be equipped with exhaust pipes, the size of which must be determined by the width and operation of the emery belts.

TABLE 3.—SIZE OF BRANCH PIPES FOR BUFFING, POLISHING AND GRINDING WHEELS

	Size of Branch Pipe for	
Diameter of Wheels, Ins.	Rag Wheels, Ins.	Hard Wheels, Ins.
6 or less	3.0	3
7 to 12	4.0	..
7 to 16	...	4
13 to 16	4.5	..
17 to 24	5.0	5
25 to 30	6.0	6

PROPORTIONS OF EXHAUST FAN AND PIPING.

The inlet of the exhaust fan should be at least 20 per cent. greater in area than the combined areas of the several connections to the hoods, and this increase should be carried proportionately in the main pipe throughout the entire trunk line. The piping on the outlet of the exhauster should also be at least 20 per cent. greater in area than the combined areas of the several connections to the hoods. The main trunk line should be provided with suitable cleanouts not more than 10 ft. apart, and the end of the main trunk line should be blanked off with a removable cap placed on the end.

TEST.

Sufficient suction head should be maintained in each branch pipe within 15 in. of the hood to displace 2 in. of water in a U-shaped tube. The pressure is to be taken by pressing the tube attachment over the small opening through the pipe, commonly called the static method. Tests are to be made with all branches open and unobstructed.

SAND-BLAST ROOMS AND APPARATUS.

Sand-blasts should be provided with reasonably dust-tight flaps or similar protective device over the two openings through which the workers' hands must be inserted;

and the cabinet should be mechanically exhausted by means of at least a 3 or 3½-in. pipe connected to a fan system, through which a linear air velocity of at least 2,000 ft. per min. is maintained. If a cover of fine wire gauze protects the back of the glass window through which the operator watches his work, the glass will not become clouded by the abrasive action of the sand. Working gauntlets should be provided; and all parts of the cabinet kept in repair to guard against leaks.

On larger work and that which requires cleaning, the commercial types of mechanically exhausted sand-blast barrels and rotary tables are both sanitary and satisfactory.

When the character of work handled is of too great a size to permit the employment of the rotary-table, only the most approved make of air-tight and mechanically exhausted sand blast room should be installed. It is essential that in addition to the overhead fresh-air supply, the floor be provided with a grating and be exhausted by means of a powerful down pull and that the operator be provided with special clothing and a helmet. In an efficient equipment the air of the room is completely changed every 6 sec.

BABBITT AND LEAD ALLOYS.

As the lead content of white-metal bearing alloys may run as high as 90 per cent., the control of the health hazards involved in their production is serious. Scientifically speaking, there is no hazard from lead fume, as the temperature of the kettles is never allowed to run high enough to cause actual volatilization of the lead. The danger of lead poisoning is from the oxides that form on the surface of the molten metal, and are scattered as impalpable dust by every draft, or by the operation of charging and skimming.

When pig lead is habitually used, the health of the worker may be protected by means of a mechanically exhausted crescent-shaped hood installed at the back of the kettle. This open shield hood covers from 33⅓ per cent. to 50 per cent. of the rear of the kettle, leaving the working side free. It is ventilated at its base by a pipe connected to a fan, and the minimum pull of 1,000 lin. ft. per min. is sufficient to induce a steady air current away from the worker.

When scrap lead is used and when old bearings are melted out, etc., a tight exhaust hood is necessary; also, extra cleanliness should be observed on the part of the workers. In all lead-kettle processes, metal receptacles should be used for skimmings; and no lead materials should be allowed to accumulate on the working floors.

DIPPING.

No fumes caused by metal dipping in acid or alkali solutions should be permitted to contaminate the air of the workroom. They should be promptly removed at the point of origin by means of a boxlike duct installed at the back of the crocks commonly used. This duct should be constructed of wood or metal. The main duct should have a cross-sectional area at least equal to one-half the combined areas of exhaust openings. The bottom of main duct should be 7 in. wide; the front should incline at an angle of 115° to the bottom. Exhaust openings with an area equal to 25 per cent. of the area of the liquid giving off the fumes should be located as near the point of origin of the fumes as the nature of the work will permit. A velocity of air of 1,000 lin. ft. per min. should be generated in each exhaust opening. If sheet metal is used in the construction of the duct, an acid-resisting paint should be used to prevent corrosion. The exhaust fan should be treated with acid-resisting paint to prevent corrosion. Floor gratings should be provided and rubber gloves for the operatives.

PLATING.

It is essential that a system of mechanical ventilation ensure freedom from stagnant air in the plating room. This may be accomplished by means of wall fans, when the tanks are located near the side of the room; or by overhead hoods mechanically exhausted; or with ventilating stacks, when the plating operations are carried on in the middle of a department. A natural-draft hood, to be effective, should only depend on a stack or stacks direct to the outer air, in a proportion of a square 12-in. stack to every 36 sq. ft. of hood area. Wooden gratings should always be provided in the plating room and rubber gloves should be provided for the operators.

ENAMELS AND LACQUERS.

The solvents for the pyroxylin, which forms the basis for the lacquers and enamels used on metal-finishing, are not only highly inflammable but poisonous to those exposed to their fumes. Wood alcohol, benzol, amylacetate, amylalcohol, volatile ketones, and acetone are (except the last two) admitted to be injurious to all who breathe them.

The fumes evolved during dipping or spraying should be controlled at their point of origin. Mechanically exhausted spray booths are now in the market, or may be "home made"; but the only type that should be chosen is one with an overhung top and a sufficient fan pull on the exhauster to ensure an air motion of at least 2,000 lin. ft. per min. As the fumes are heavy, the exhaust vent should be at the back of the booth and on a level with the face of the operative. If a second exhaust opening is required on large work, a down pull through a bottom grating will be found more satisfactory than an overhead equipment.

A balanced supply of fresh air should be admitted to the lacquering department. This should pass over steam coils in winter, so as not to unduly lower the temperature of the room.

WASHING, TOILET AND DRESSING-ROOM FACILITIES.

Standards have been adopted for washing, toilet and dressing-room facilities by the New Jersey Department of Labor.

WORKING CUPRO-NICKEL.

Stamping, drawing and general press work on cupro-nickel will be found to be attended with no greater difficulties than with brass. The metal can be more drastically treated and greater reductions can be taken, although more power is required than with most alloys in use for this purpose. It is not practical to anneal cupro-nickel articles between operations, chiefly on account of the great tendency toward fire-cracking and also excessive scaling, which is very difficult to remove and which, unless it is entirely removed, will ruin punches and dies. Some idea of the extent to which this metal may be worked without annealing can be gathered from the fact that cupro-nickel bullet jackets, approximately 1½" long before trimming, are drawn from sheet metal without annealing. The operations on this jacket are, blank and cup, 1st. draw, 2nd. draw, 3rd. draw, initial pointing, final pointing and resizing.

In conclusion it would appear as though this valuable alloy, which in the past has not received the consideration that it should have had, deserves the attention of manufacturers of drawn and pressed metal articles, electrical supplies, etc., inasmuch as it has properties not possessed by any other commercial usable copper alloy.

METALS IN THE WORLD WAR

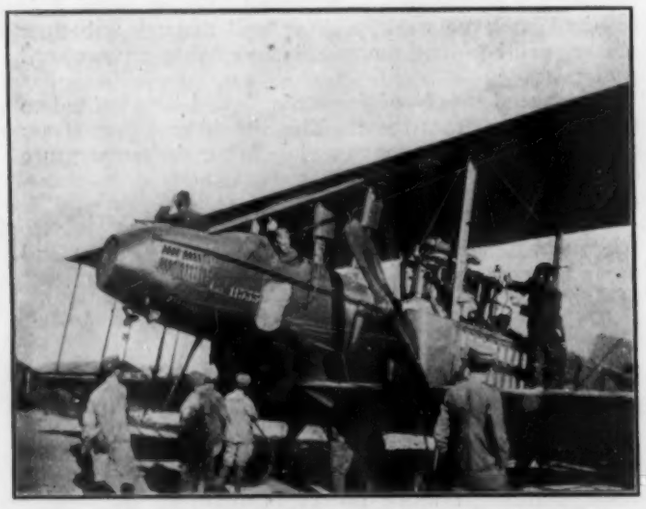
A Brief Description of Their Application in the Construction of a 600-horsepower Caproni Bombing Airplane.

Written for The Metal Industry by Lieutenant F. B. Krom, Late of American Air Service Attached to 203rd Caproni Squadrilla of the Italian Royal Flying Corps.

It would not seem to the casual observer that there was much metal aside from the motors in a heavier-than-air flying machine, and as a matter of fact, there is not in proportion to the size of the aeroplane. But there is some, and this article is written in an attempt to describe the use of metals and alloys in the construction of the type of machine known as the Caproni Seis Cento. As for the exactness of each statement with regard to the composition of the various parts, please bear in mind that the writer is not an expert, but the observations are made from the standpoint of a pilot, so there may be some slight errors.

LT. F. B. KROM.

The Caproni Brothers have designed many types of machines aside from the heavy bombing type under consideration. Of the latter, they make a 300, 450 and a 600 horsepower biplane, designed to carry two pilots, one of whom acts as the bomber when the objective is reached, both acting as pilots as the machine is too heavy for one man to drive for a period of from two to three hours.



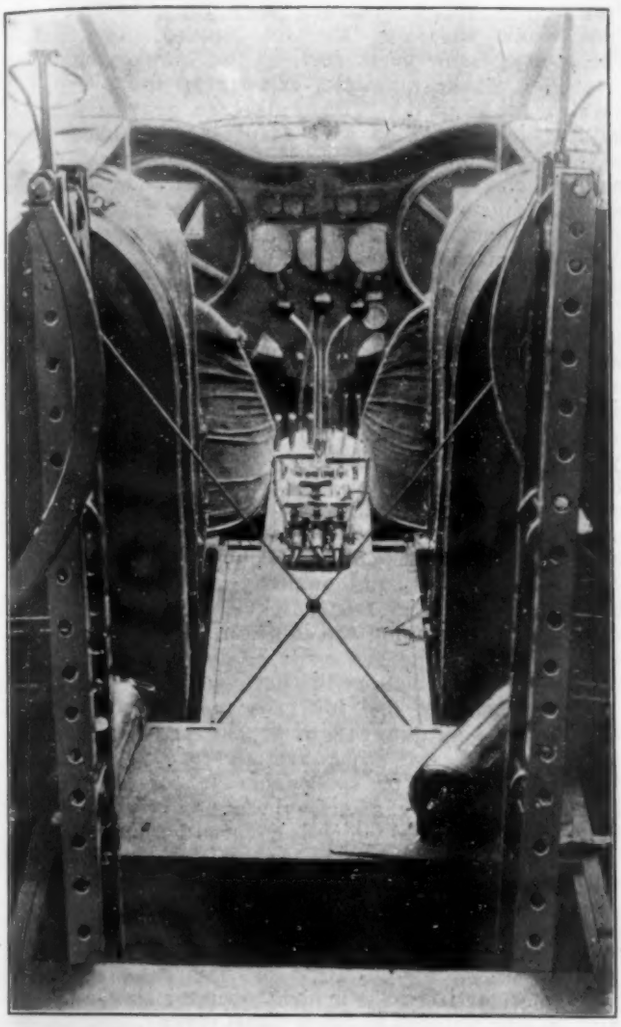
"TUNING-UP" a 600 HORSEPOWER CAPRONI PLANE PREPARATORY TO A FLIGHT. NOTE THE ALUMINUM CRANKCASE AND CARBURETOR.

THE SPOT ON THE PIAVE RIVER WHERE THE BRITISH STARTED THE BIG PUSH THAT ENDED THE WAR IN ITALY. NOTE THE BARBED WIRE IN THE FOREGROUND.

The pilots sit side by side, each with a complete set of controls though all bomb releases are on the right hand side of the body or "Carlinga." Directly in front of the pilots sits the observer whose duty it is to direct the machine. He sits on a movable seat with a machine gun on a rack attached to the seat, thus giving him a clean sweep of the front and partially of the sides and underneath the body. Before going further it might be well to state that the motive power of the machine being described, the Ca_s or six hundred. is furnished by three motors, two of the tractor type on either side of the "Carlinga" and one of the pusher type, directly in the center at the rear of the body. These motors are Fiats of a block test of 312 horsepower each so while the plane is named the six hundred, it actually has a horsepower of over 900.

To go back and finish telling of the load carried, the fourth member of the crew is a machine gunner who has a "nest" directly over the centrale or center motor, giving him a clean sweep of the rear, top and a partial one of the underneath of the plan. A rather uncomfortable location for the man in the zone of action for he is exposed to the full blast of air made by the machine cutting through the atmosphere at a speed of from 90 to 110 miles per hour. Incidentally standing full length he makes an excellent target in case of attack though the odds are about even unless he is caught asleep.

Some of the biplanes carry the fifth man into action, a mechanic or Motoristi who has a little seat between the two side motors in the rear of the pilots. It is his duty to look to the motors and fix any little thing such as a broken connection, should anything go wrong while in the air. In the tri-planes, a much larger machine of the same horsepower, the Motoristi is always carried and in place of the rear machine gunner, there are two, one in each of the tail fuselages making the tri-plane, though a slower machine, a wonderfully protected one. These large bombing planes, while designed originally for night work, were used as much in day raids as they were at night, being accompanied by an escort consisting of small fast chasse' planes whose duty it was to protect the slow moving and heavily ladened machines, carrying up to a half ton of explosives. It might be mentioned here that an actual test was made to determine the capacity of the 600 type at the Caproni testing field near Milan,



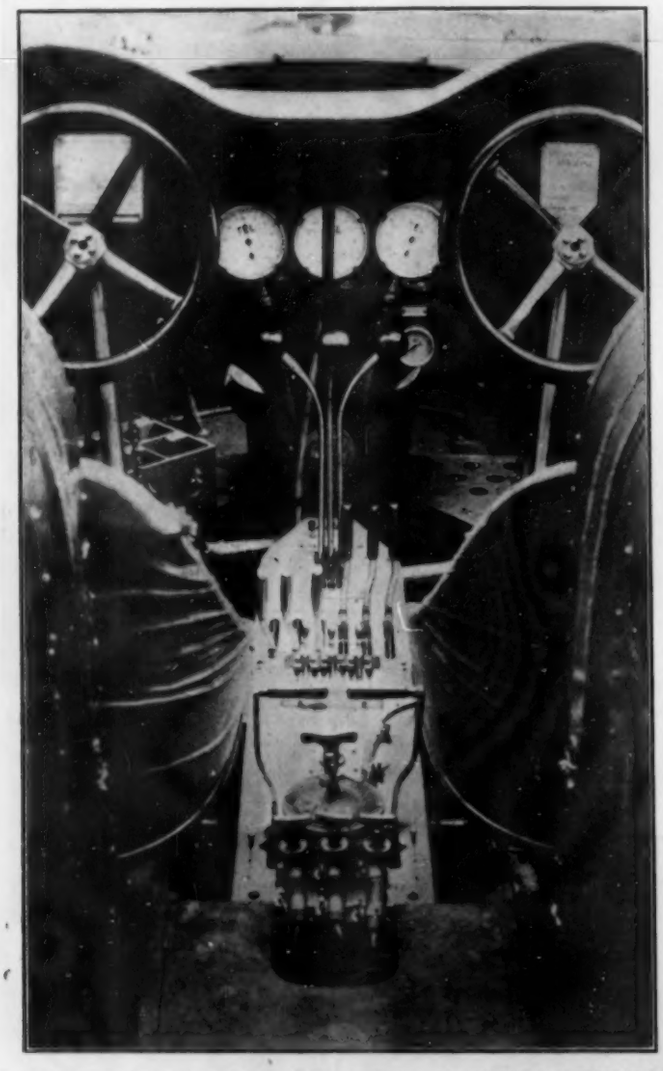
A PHOTOGRAPH OF THE COCKPIT OF A 600 HORSEPOWER CAPRONI BOMBING PLANE. THE BOMB RACKS ARE SHOWN IN THE FOREGROUND, ONE ON EITHER SIDE, BUT ARE OPERATED BY THE PILOT ON THE RIGHT.

TENENTI RIGOLONI, A CAPRONI TRI-PLANE PILOT, AND HIS OBSERVER, TENENTI ALBINGA, READY FOR A RAID.

CONEGLIANO, ITALY, HELD BY THE AUSTRIANS, AND BOMBED BY THE ITALIANS.

Italy in which Semprini, the writer's instructor and one of the finest pilots in Italy to day, attained an altitude of over 3,000 meters, with a load of two tons.

All this has been rather an introductory description of the machine and a bit of its work, but I trust it is not devoid of interest. Just one more item before telling about the composition of the metals employed. There is much talk in the aerial world of the crossing of the Atlantic by large planes. Caproni hopes to send Semprini in a newly designed Caproni of between three and six thousand horsepower across the big drink. I saw one of his largest planes under construc-



ANOTHER VIEW OF A COCKPIT OF A CAPRONI 600 HORSEPOWER BOMBING PLANE. THE CONTROL PARTS IN REGULAR ORDER ARE: THE TACHOMETERS TO MEASURE SPEED OF ENGINE; THROTTLE LEVERS WITH THE LARGE BALL HANDLES; SPARK LEVERS, WITH LONG WOODEN HANDLES; AUXILIARY AIR SUPPLY LEVERS, WITH SHORT HANDLES; SWITCHES FOR IGNITION BATTERY, AND FINALLY THE GAS PRESSURE CONTROL SYSTEM.

tion of 2,100 horsepower and the magnitude of one so much more powerful simply astounds me.

In writing of the one type and its few parts other than iron or steel, all types are included for the details of the machines are about the same.

The largest metallic part of the plane is, of course, its motors, the working parts of which are iron or steel. The 450 horsepower uses the Isotta Fraschini, while those of the six hundred are Fiats. The non-working parts such as the crankcase, gear coverings, intake manifold, carburetor and oil feeds are all made of metal. The crank-case, gear coverings and the carburetor as well as pressure gauges, are essentially composed of aluminum, while the intake manifold and oil feed are made of copper. The delicate bearings, I believe, are mostly babbitt metal or bronze. In some instances in the construction of motors, aluminum piston rods and heads are used, but I am not certain as to the case of the Isotta or Fiat motors.

The next of importance are the gas tanks and feeds, four of the former being carried, two in the body and two in the tail fuselages, one on either side. These are made of copper with brass or bronze caps. Feed pipes are all copper and the stop cocks of the gas pressure system are brass. The picture of the control system shows the two large body tanks and between the seats, the control board which is apparently composed of aluminum. First on the board from the rear of the picture or front of the machine, are the throttles which seem to be made of an aluminum composition. Next are the spark and auxiliary air controls which may be aluminum or steel, nickel plated, as far as I could tell. Then come the ignition switches made of brass and lastly the gas pressure system, the top of which is brass as well as the pet cocks.

The tachometers, one for each motor, called "rev-counters," the oil gauges, gas pressure gauge, the air-speed meter Pesuti type, are all set in aluminum cases. The spider or spokes of the control wheels, shown in the picture, are aluminum as is probably the skeleton of the wheel which is covered by hard rubber. The honeycomb radiators are made of brass and bronze while the oil radiators, one to each motor, are made of copper.

BLACK FINISH ON ZINC

The most satisfactory method of producing a black finish on zinc plates is by black nickel plating.

Water	1 gallon
Double nickel salts	6 ounces
Sal ammoniac	1 ounce
Zinc sulphate	1 "
Sodium sulpho cyanide	3 ounces

Use anodes of nickel or brass with a normal temperature and from ½ to 1 volt pressure of electric current.

Experiments have recently been made with the use of single nickel salts for producing a black deposit upon zinc and a very uniform deposit has been obtained. The proportions should be from 12 ounces upwards per gallon of water and used at a temperature of 120 degrees and upwards. We do not believe that even if a temperature up to 180 degrees Fahr. is used that it will materially alter the temper or resist on the zinc.—C. H. P.

CARE OF A ZINC SOLUTION.

In order to replenish a zinc solution a stock solution should be made up as follows, and proportions added in order to keep up its strength:

Water	25 gallons
Sodium cyanide	16 pounds
Zinc cyanide	16 pounds
Caustic soda	16 pounds
Aluminum sulphate	1 pound

—C. H. P.

STRUCTURAL CHARACTERISTICS OF ROLLED SHEET BRASS

SOME NOTES ON THE APPLICATION OF METALLOGRAPHY TO THE NEEDS OF THE ROLLING MILL.

WRITTEN FOR THE METAL INDUSTRY BY H. A. EASTICK.

Notwithstanding the progress which has been made in the application of the principles of metallography to the sheet metal industry, we still find that there exists considerable misunderstanding and lack of definite knowledge as to the structural changes which take place in metals and alloys upon cold-working and annealing them. Most of us are familiar enough with photomicrographs of the structure of sheet brass, and can interpret the structural characteristics generally met with, but the theory and principles underlying structural changes attending cold-working and annealing treatment are not so generally known.

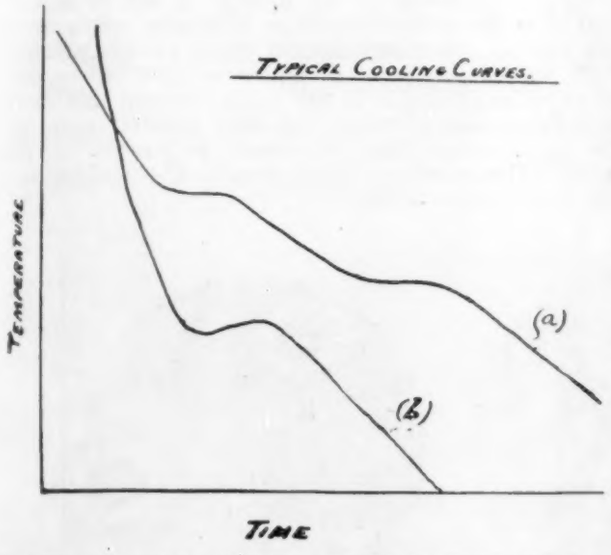


FIG. 1. TYPICAL COOLING CURVES OF SHEET BRASS.

Before proceeding further, it will be necessary to discuss briefly some of the laws and phenomena of physical chemistry which form the explanation of the structural changes which take place in metals.

If a small quantity of a pure metal be placed in a crucible and heated to well above its melting point and periodic observations of its temperature while cooling be made, the curve obtained by plotting the temperature against the time will be of the form shown in Figure 1-A. If the conditions of cooling are such that it cools very slowly, the curve may take the form shown in Figure 1-B.

The explanation of the break shown in the two curves is that at the moment of melting, the metal required a certain amount of energy to change its state from a solid to a liquid, and in cooling, this energy was liberated in the form of heat. During the cooling period, any such generation of heat as we have here would, of course, result in the temperature of the body remaining stationary, or even rising as in Figure 1-B. The heat liberated by liquids on solidification, or absorbed by solids on liquefaction, is known as the Latent Heat of Fusion, and is a constant for all substances.

The generation of heat caused by liquids changing their state to that of a solid affords a very accurate method of determining the freezing point of liquids and is the one generally employed in the construction of the diagram of Thermal Equilibrium of a series of alloys.

If we take two metals, such as lead and antimony, and make up a series of alloys, varying in composition from pure lead to pure antimony, the melting point of each alloy be determined, and the melting points be plotted against the composition, a diagram is obtained as in Figure 2. Examination of this diagram will show that pure lead melts at a temperature of 326° C. and that upon adding antimony to the lead, the melting point of the alloy is progressively lowered until at 13 per cent antimony, the melting point has reached 245° C. Upon further addition of antimony to the alloy, the melting point again rises until with pure antimony it is 630° C. The alloy having the lowest melting point in the series is represented on the diagram by the point B, and is known as the eutectic alloy.

If two liquids such as alcohol and ether are shaken together and allowed to stand, they will separate into two layers; one of the two parts into which the liquids separate will be a saturated solution of ether in alcohol (or alcohol in ether); and the other will be an excess of alcohol or ether, whichever liquid happens to predominate. In other words, the alcohol will absorb or dissolve a certain definite quantity of ether and no more, and any excess of ether will not mix or dissolve with

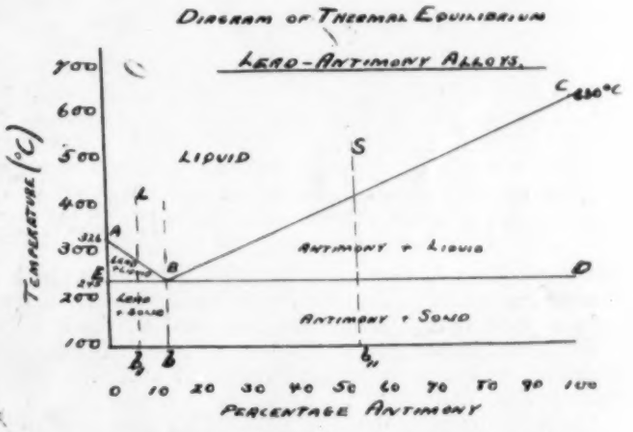


FIG. 2. THERMAL EQUILIBRIUM DIAGRAM OF LEAD ANTIMONY ALLOYS.

the alcohol solution, and, therefore, separates out from the rest of the liquid.

Exactly the same condition obtains in the case of the two metals now under consideration. We have the two liquid metals, and which being liquid will, therefore, be represented by points above the line ABC in the diagram, and we have a condition where the lead will dissolve 13 per cent of antimony; this solution will be saturated with respect to antimony, therefore upon solidification the excess of antimony or lead will separate out in the form of grains or crystals, surrounded by the eutectic.

Before proceeding further with a description of this diagram and its significance, we must consider the various states in which solid and liquid metals can exist. These are as follows:

1. The two metals are mutually soluble to a certain extent while in the liquid state, but upon solidifying,

they are immediately thrown out of solution and become mechanical mixtures. These alloys form eutectics, and the eutectic alloy represents the point at which the two metals are mutually saturated with respect to each other while in the liquid condition.

2. The two metals while liquid may completely dissolve in each other and upon solidifying they may still remain in solution, or, in other words, they crystallize together and are isomorphic. The resulting solid alloy is known as a solid solution and is so called because of the fact that all of the required properties of a solution are fulfilled by the two metals, even though they are in a solid state instead of liquid.

3. Metals which do not dissolve in each other while in a liquid or solid state and are therefore purely mechanical mixtures.

Referring to the Lead-Antimony diagram, let us follow the course of a line moving through the point B, or the line Bb, this line represents the alloy containing 13 per cent antimony, and is the eutectic of the series. described fall into class I. of the states in which metals can exist as outlined above; namely, they are partially soluble while liquid and insoluble when solid.

COPPER-NICKEL ALLOYS.

Let us now consider the case of the alloys of copper and nickel. The equilibrium diagram of these alloys is given in Fig. 3. This diagram of thermal equilibrium is obtained in exactly the same manner as the lead-antimony diagram, i. e., by obtaining the melting points in a series, and plotting these against the composition.

Upon examination of this diagram it will be noticed that there is no eutectic point. The curve representing the melting points is a smooth curve, rising gradually from the melting point of copper at 1084° C. to that of nickel at 1451° C. It will also be noticed that there is a lower line following the same general course of the upper, except that it is inverted with respect to the latter. The upper curve is known as the liquidus and the lower, as the solidus.

PLATE I.

Fig. 1. Lead-antimony eutectic (13 per cent antimony).

Fig. 2. Lead-antimony alloy (8 per cent sb_1) showing crystals of lead surrounded by eutectic.

Fig. 3. Lead-antimony alloy (55 per cent sb.), showing crystals of antimony surrounded by eutectic.

While this alloy is above the line ABC, it consists of a saturated solution of antimony and lead. Upon reaching the point B or a temperature of 245° C. the liquid solidifies, and in doing so, the two metals lose their mutual solubility, and separate out as the solid eutectic. See Plate 1, Fig. 1.

Again let us take the line LB_1. This represents an alloy containing 8 per cent antimony. While in the liquid condition, the metals are in the form of a solution of 8 per cent antimony in lead. Upon cooling to the point intersecting the line AB, crystals of lead will begin to appear with the result that the remaining liquid will become richer and richer in antimony until a concentration of 13 per cent antimony is reached, at which point the whole mass will solidify and will consist of crystals of lead surrounded by a network of eutectic. This point is represented on the diagram at the intersection of the line ED by the line Lb_1. Plate 1, Fig. 2 shows the structure of the alloy of this composition.

Again taking the line Sb_{11}. At the point of intersection of the line ABC, crystals of antimony will be precipitated and will be surrounded by a still liquid network of eutectic. This condition will continue during cooling until the point of intersection of the line ED, when the eutectic will solidify and the mass will consist of crystals of antimony surrounded by a solid eutectic. See Plate 1, Fig. 3.

The alloys of lead and antimony which have just been

These alloys of copper and nickel fall into Class II. of the states of metals as given above; i. e., they are completely soluble while liquid and remain so when solid, or, in other words, they form a solid solution. The German word expressing this state in which metals can exist gives a very clear idea of the condition in which the metals are; it is "Mischcrystall." Metals which crystallize together in the same form, such as these do; are isomorphic. Many salts and minerals crystallize together in the same manner, such as copper-sulphate and ammonium-sulphate.

Many alloys, such as copper and zinc, form more than one solid solution; i. e., one metal will dissolve another up to a certain definite concentration, beyond which another type of solution is formed, usually having different properties from the first. In some alloys, as many as four or six different solid solutions may occur. A good example of such a condition is offered by the copper-zinc alloys, which form six different phases or solid solutions, containing different concentrations of zinc in the copper.

The diagram of thermal equilibrium affords much information as to the physical properties and peculiarities of strength met with in different alloys, and by its use we can foretell to a certain extent, the general characteristics and properties of any given alloy.

As a general proposition, those alloys which form eutectics are not of much use where a high order of

mechanical properties or strength is required. The following explanation should make this clear:

If the fracture of a specimen of an alloy consisting of only one constituent, or, in other words, a solid solution, be examined under the microscope, it will be found that the fracture has taken place through the crystals themselves and not at the boundaries of them; that is to say, each crystal has broken through in the middle rather than having been pulled apart from adjacent crystals, all of which would indicate that the cohesion between crystals is stronger than the crystals themselves. An

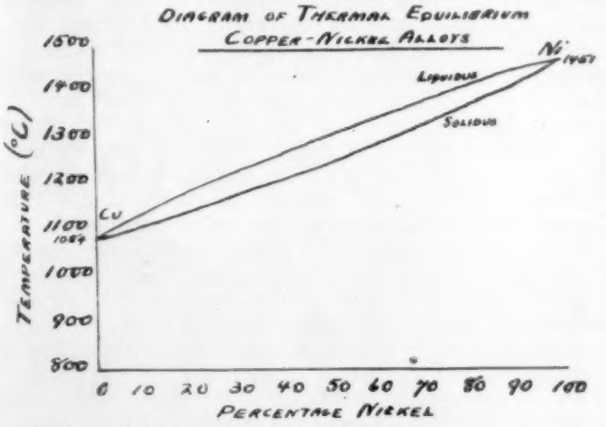


DIAGRAM OF THERMAL EQUILIBRIUM, COPPER-NICKEL ALLOYS.

alloy containing an eutectic will, as we have seen in the case of the antimony-lead alloys, consist of crystals of one metal separated from each other by the eutectic of that metal with the other constituent of the alloy. It is easy to see, therefore, that the ultimate strength of that alloy can not in any case be greater than the strength of the eutectic itself, inasmuch as the eutectic forms a series of links in a chain. As a general rule, eutectics do not possess very much mechanical strength and are very brittle.

of bismuth and copper form an eutectic which is situated very closely to the copper concentration end of the diagram of thermal equilibrium. A very small percentage of bismuth, therefore, results in the formation of the eutectic which having a much lower melting point than the copper, will remain liquid long after the crystals of

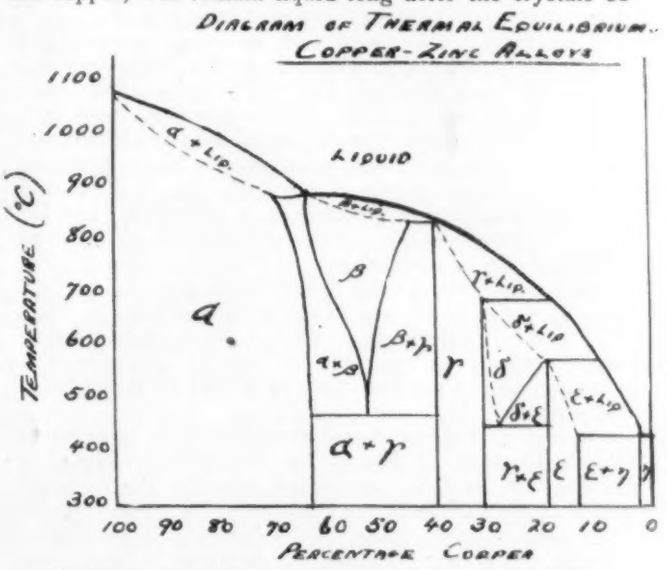


DIAGRAM OF THERMAL EQUILIBRIUM, COPPER-ZINC ALLOYS.

copper have solidified, and will therefore form a network of eutectic around the crystals of copper, thus destroying all of their cohesive strength for one another.

We find that most of the alloys which are of use in engineering practice consist of either one or two solid solutions. Alloys which contain more than one solid solution occurring simultaneously in the alloy are usually workable while hot, and possess a higher tensile strength and lower elongation than those consisting only of one solid solution.

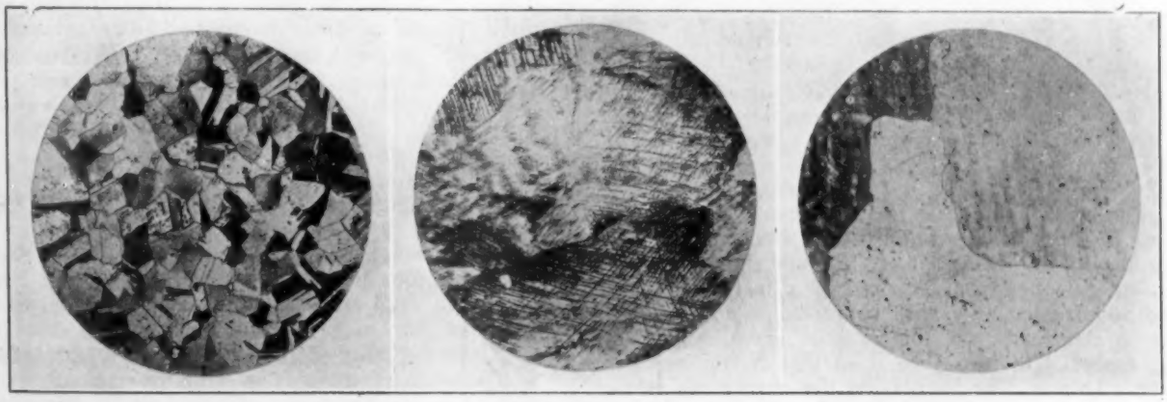


PLATE II

Fig. 4. Cast Brass (67 per cent copper).

Fig. 5. Cast Brass (67 per cent copper). Same as Fig. 4, after cold rolling.

Fig. 6. Annealed brass, 67 per cent. copper (same as Fig. 5, after annealing at 1,100 degrees Fahr.).

A good example of the weakening effect which the presence of an eutectic has upon a metal or alloy occurs in the case of pure copper containing a very small percentage of bismuth. As is well known, even as small a percentage as .02 bismuth introduced into pure electrolytic copper, will render such copper absolutely worthless. It will be found impossible to either hot or cold-roll such metal, and it can not be worked at all without falling to pieces. In this case we find that the alloys

Fig. 4 is the diagram of thermal equilibrium of copper-zinc alloys. It will be observed that at ordinary temperatures the alloys containing from 63.5 per cent copper to 100 per cent copper consist of a homogeneous solid solution. Alloys within this range are referred to as "alpha brasses" on account of the fact that they consist of what is known as the alpha solid solution. Sheet brass containing less than 63.5 per cent copper is not usually met with and will not be considered here.

Cast structures of metals and alloys usually consist of large rounded grains which do not resemble crystals. The sharp angular characteristics of crystalline formation are only obtained after the metal has been cold worked and annealed. Alpha brasses are no exception to this generalization. Plate II., Fig. 4 shows the structure of cast brass containing 67 per cent copper.

If we take a cast metal such as brass and perform upon it cold work, such as hammering, rolling, drawing, etc., we find that the large rounded primary grains have been distorted out of shape. If the work has been very severe the grains will become almost obliterated, and the structure will be practically amorphous. The appearance of the cast brass shown in Plate II. Fig. 4 after cold work has been performed upon it, is shown in Plate II., Fig 5. Upon annealing this cold-worked or strained metal and again examining it, we find that the original structure has completely disappeared and an entirely new crystalline structure has been formed, as in Plate II., Fig. 6. It will be observed that the crystals are now sharply defined and show more of the characteristics of true crystals than the rounded grains of the original cast structure.

All metals undergo some remarkable changes upon being cold worked; that is, by hammering, rolling, or drawing, or, in fact, any means whereby the metal is caused to flow while in the cold state. The most obvious change which takes place, is the increase in maximum strength and elastic limit and the decrease in elongation, or, in other words, the metal becomes very much harder and correspondingly brittle.

At this point it seems advisable to consider definitions of some of the terms which are somewhat loosely applied in common practice. The word "hardness" as applied to metals is too ambiguous to be of service. As ordinarily applied, it means the possession by a metal of a high compressive and tensile strength with little or no elongation. Theoretically, perfectly soft metal would have no elastic limit with infinite extensibility, and conversely, the theoretically perfectly hard metal would have infinite elasticity with no elongation.

The elastic limit of a metal may be defined as being the load at which the metal commences to flow. Bearing this consideration in mind, therefore, we find that with a very hard, brittle metal, the elastic limit and maximum tensile strength practically coincide, and conversely, with a very soft metal the elastic limit is very small in comparison with the maximum tensile strength. Carrying this definition of elastic limit a little further, we may say that it is the load at which the crystals of a metal commence to slip with respect to each other. This slippage even taking place in the individual crystal.

If we take a piece of soft metal, such as the sample of cast brass shown in Plate II., Fig. 4, and deform it in such a way as to exceed its elastic limit, we find that each crystal has on its surface a series of lines. These lines are parallel in the same crystal, but show different orientation from crystal to crystal. They may be observed on close examination of Photo No. 5. They are known as "slip bands" and are the result of the cleavage planes in each crystal slipping.

(To be continued.)

THE USE OF ARSENIC AS A FLUX IN BRASS

Written for The Metal Industry by G. C. Holder, Chemist, Wheeler Condenser and Engineering Company, Carteret, N. J.

The use of arsenic as a flux has never generally been countenanced, and by foundrymen has always been looked upon as a good thing to keep away from. Many of the objections have been without foundations, but they nevertheless remain. Arsenic is the one element which approaches nearest to the action of a flux, because it promotes the union of metals that would otherwise be difficult to mix.

A glance at the physical properties will convince one that it has a beneficial effect. All tests here described were made from castings poured into a green sand mold, and the figures are taken from an average of three tests.

Arsenic as a flux must be used judiciously, but the same precaution holds true for all fluxes. When large amounts of scrap are used and it is treated with arsenic, the metal will be nice and lively and not show the tendency of sluggishness characterized by a heat when scrap is used and treated only with charcoal.

Due to the ready volatilization of arsenic it is, of course, essential to introduce it so that it can perform its duty. This is done by placing the charge of arsenic into a copper receptacle and clamping the edges to an iron stirrer, and plunging it into the molten mass while the crucible is still in the pit furnaces. Care must be taken not to get the charge too hot before introducing the arsenic in order to minimize the danger of spurting.

The experimental heat using all scrap and 40% arsenic showed a percentage of elongation in 2 inches of 23.6, which is remarkable when compared with the heat in which 50% scrap was used and no arsenic, which showed a percentage of 8.75 in 2 inches.

It will be noted that no tin was introduced into heats using scrap.

Formula.	Amount of Arsenic.	Average Brinell Hardness.	Average Elongation in 2 Inches.	Load per Square Inch. Average Load at Elastic Limit.	Load per Square Inch. Average Load at Ultimate Limit.
New metal— 80 Cu, 6 Pb, 4 Sn, 10 Zn	None	36.3	15%	8,979	21,251
New metal— 80 Cu, 6 Pb, 4 Sn, 10 Zn	.20%	37.5	21.8%	9,383	27,722
New metal— 86 Cu, 6 Pb, 2 Sn, 6 Zn	.20%	24.1	18.6%	9,000	24,757
50 Scrap, 40 Cu, 5 Pb, 5 Zn	.25%	36.7	19.1%	9,045	25,837
50 Scrap, 40 Cu, 5 Pb, 5 Zn	None	33.1	8.75%	6,686	14,146
All scrap...	.40%	41.7	23.6%	11,660	29,413

ALUMINUM: ITS USE IN THE MOTOR INDUSTRY IN ENGLAND

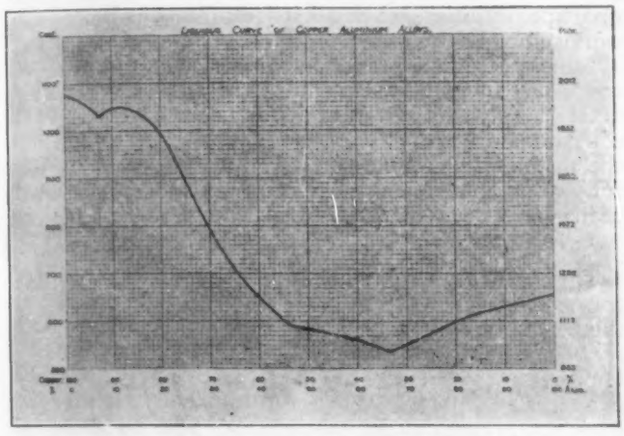
AN ARTICLE DEALING WITH THE APPLICATION OF THE METAL IN REPLACING STEEL AND OTHER METALS.

BY E. CAREY HILL, M.Inst.Met. (Technical Director of Rowland Hill & Sons, Ltd., Aluminum Foundry.

SECOND AND LAST PAPER. THE FIRST PAPER APPEARED IN THE METAL INDUSTRY, DECEMBER, 1918.

ALLOYS OF ALUMINUM, ZINC AND COPPER.

This series of ternary alloys have considerable possibilities, and one or two are used to a very large extent. There has not been the same amount of research work conducted with regard to them at present as in the case of the binary alloys. It is found that by the addition of a small percentage of copper to alloys containing from 5 to 25 per cent. of zinc, the tenacity is increased and greater rigidity attained. An alloy consisting of 2 to 3 per cent. copper and 8 to 10 per cent. zinc, is very largely used in the casting of motor parts, and is the English equivalent to the American 8 per cent. copper alloy. Greater tenacity is attained by increasing the zinc content right up to 20 per cent. and even 25 per cent., and the alloy presents no corresponding disadvantages in so doing, except its increased specific gravity. The present demand is for an alloy not to exceed about 2.9 specific gravity, and it is possible that this is a mistaken attitude, as the increase in tenacity is of greater advantage than any loss caused by the slightly increased specific gravity. Surprising results can be obtained by working these alloys. A half-inch hot rolled bar of an alloy containing 25 per cent. zinc and 3 per cent. copper will give a yield point of 27 tons per square inch, and a breaking strength of 31.7 tons per square inch, and an elongation of 20 per cent. on 1 inch. The specific gravity is raised by this treatment to 3.29. Remarkable results have also been obtained with an alloy containing 20 per cent. zinc and 3 per cent. copper; special processes have been applied for the production of bars of this material, which is difficult to roll. This last alloy is considerably used in the foundry for castings in which greater tenacity is required, and in which the very low specific gravity of the other alloys mentioned is not of such importance.



COOLING CURVE OF COPPER—ALUMINUM ALLOYS.

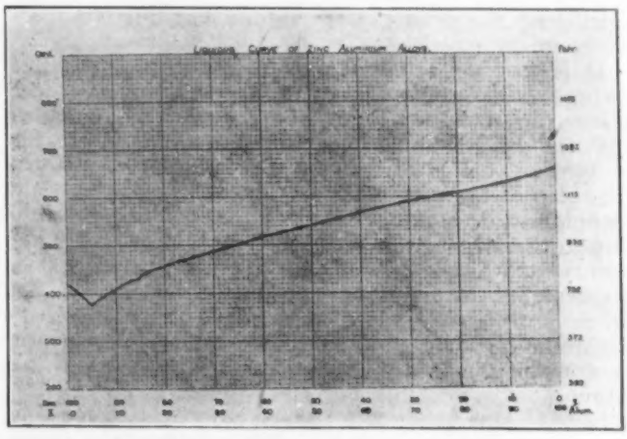
Other metals with which aluminum is alloyed are tin, nickel, manganese, and magnesium.

ALLOYS CONTAINING TIN, often with copper added, have been used to some extent in France, and by a few manufacturers in England, but they have not come into general use to anything like the same extent as the copper and zinc alloys. It has been said that alloys with tin do not show quite so pronounced a tendency to draw as the zinc alloys; if this is so, it may be due to a diminution in the contraction when tin is present in sufficient quantity.

Nickel is used with a view to producing a very light tough alloy, and has been tried, I believe, in bicycle rims and similar parts. I have myself found that in spite of the high melting point of nickel, 1452 deg. C., there is no difficulty in dissolving nickel in molten copper or bronze at much lower temperatures.

MANGANESEis found to be of advantage in producing considerable tenacity when added in association with small percentages of copper up to 4 or 5 per cent. The manganese itself should not exceed 1½ to 2 per cent. The compound Al Mn_8 readily forms, and being very hard and brittle renders higher proportions of manganese detrimental to the strength of the alloy. The alloys mentioned give favorable results in chill castings, but do not lend themselves to working, such as rolling and drawing. Small quantities of manganese, .2 to .4 per cent. have been, found in the alloys of which the angle and channel sections, used in Zeppelin airship construction, have been made. The alloy known as "Duralumin" also contains a trace of manganese.

MAGNESIUM has been much advocated as a means of producing a strong light alloy of aluminum. Its very low specific gravity, 1.75, much lower even than aluminum, enables it to be added in any desired proportion with increased lightness in the resultant alloy instead of that rising specific gravity which is frequently a bar to the use of other aluminum alloys.



COOLING CURVE OF ZINC—ALUMINUM ALLOYS.

The series of alloys known as magnalium, containing up to 10 per cent. magnesium or more, are now fairly well known. The strength with 10 per cent. magnesium is approximately 10½ tons per square inch in a sand casting, 15 tons in a chill casting, and 27 tons when water quenched. Duralumin contains from .5 to .75 per cent. magnesium. Unfortunately, magnesium at the present time is rather difficult to obtain, as well as being very expensive. Six months ago, I was quoted 20s. per lb. It is said that magnesium alloys are very easy to machine, and that the saving in wear on cutting tools is noticeable.

ALUMINUM IN RECIPROCATING PART OF ENGINE.

PISTONS.—Aluminum alloys are now recognized on account of their lightness as having great possibilities

for use in the reciprocating parts of engines. By a small reduction in weight of such parts, a large amount of energy may be saved, resulting in much greater efficiency in the engine.

Pistons have been fitted in American and French engines in one or two cases for two or three years now, cast in a variety of aluminum alloys. The tremendous production of aeroplane engines required by the war has given an impetus to research in this direction in England, with the result that numerous makers are experimenting, and a few have already standardised an aluminum piston. The requirements for the best result in an aluminum piston are rather out of the ordinary; in the first place, what appears a disadvantage, namely, the high expansion of aluminum, has to be dealt with; when this is understood and provided for, however, it presents little difficulty. I believe it is the practice in America to allow .002 in. per inch diameter clearance between piston and cylinder wall; at any rate, this is recommended as a safe clearance to start with; the minimum possible must be found by experiment with each engine, as the temperature attained, and the cooling facilities vary in each design. It is said that a considerable advantage of an aluminum piston is that there is little or no depositing of soot or charred oil on the crown, as in the case of iron pistons. This may be due to the high thermal conductivity of aluminum, viz., 31.3 as compared with iron 11.0 or little more than one-third; in fact, aluminum is only exceeded by copper in this respect, so far as the baser metals are concerned.

In many cases aluminum pistons may be successfully introduced in place of cast iron or steel without modifying the design of the engine, but this is not always sound practice.

It is perhaps a mistake to endeavor to make this change in the case of an engine with a very short piston; in such a case, I have seen it recommended that the design should be modified to admit of greater length, up to 1 1/3 times the diameter of the pistons. The slap of the piston skirt against the cylinder wall, complained or by some motor engineers, and possibly due to the large clearance provided, is necessarily accentuated in a short piston, and modified in a larger one. As designers come to appreciate the benefits of the aluminum piston its peculiarities will be met, and the design built around it, as surely should be the case; for is not the piston the seat of motive power in the engine?

Now I come to the alloy which is to be used for this purpose, and here we find a wide divergence of opinions, and a vast amount of experimental work still actually in progress, so that it is not possible to make any decided statement. Generally speaking, however, any alloy containing zinc may be considered useless, being unstable under the influence of heat; tin also is not always successful as a constituent, though it has been advocated, possibly with a view to reducing the expansion of the alloy, but it has been found to be dangerous, on account of its hot shortness and the low tenacity of some alloys in which it has been tried; there remains principally copper amongst the commoner metals, and it is with the various alloys of copper and aluminum, with and without a third constituent introduced, that the present experiments are proceeding, so far as my knowledge goes.

I have seen a chart comparing the ultimate tensile strengths of some copper alloys at normal temperatures and at higher temperatures; this aspect of the matter is of great importance, owing to the high temperatures at which all pistons normally work. Of course, the strength falls fairly rapidly as the temperature rises. What is a safe working limit it is difficult to say, as no one has yet succeeded in taking the temperature of a piston crown or skirt while running at, say, one thousand revs. per minute, but it is clear that the bigger margin we have, the safer we are; the piston, of course, does not necessarily approach at all nearly to the temperature of the gases in the combustion chamber; and its temperature may be kept within limits by care in design.

Now, if an alloy can be found which, while maintaining all the other advantages of an aluminum alloy, also has the remarkable property that its tensile strength, up to a certain degree, rises with the rise in temperature, then we are indeed approaching the ideal. Such an alloy has been discovered, but as experiments with it are only now in progress, I cannot say very much about its properties. I have seen, however, a chart comparing its tensile strength with that of the copper alloys at rising temperatures, and I think that it has great possibilities, when all its peculiarities have been explored and determined.

Aluminum pistons have been used in both steel and cast iron cylinders successfully, but it is possible that better results are obtained with the latter. If all the conditions are suitably arranged, it will be found that the piston walls assume, after long running, a beautifully-glazed surface, and that the wear is no greater than would occur with cast-iron pistons.

DIE-CASTING.

This branch of the industry has now been developed to a considerable extent, and the process is applied to the production of vast quantities of small articles, such as lids, covers, meter boxes, small fittings, parts of lamps, etc., and since the war, particularly fuse and machine gun parts. When the high cost of the dies does not prevent it die castings can also be made for crankcases, gear boxes, and other larger parts, but in all such cases the design must be specially considered, and if necessary, adapted to the purpose. Pistons are also now being made in dies in large quantities. The advantages of the process are rapid production, accurate and uniform dimensions in the castings, reduced machining, a closer grain, and, in some cases, increased strength in the metal, and an improved finish in the casting. The process may be divided into three distinct classes:—

(1) Casting under pressure into a mold which is entirely of metal.

(2) Casting without pressure into an entirely metal mold.

(3) Casting into a metal mold, some small part of which, such as a core, is of sand.

No. 3 is generally called "chill casting."

No. 1.—Die casting under pressure is practised in cases where the castings are of such a nature that, owing to the risk of misruns, airtraps, etc., it is not practicable to produce sound castings otherwise; the tendency of the method is also to produce a casting of more uniform and closer grain, and sharper outline. There are various patented methods of applying the pressure to molten metal, and these consist either in applying compressed air, or preferably a chemically inactive gas, such as nitrogen, to the surface of the molten metal in a closed vessel, so that the metal is forced out through a conductor into the die, or by actually pumping the molten metal by means of a steel ram into the die; a modification of the latter process which has been used is to fill half the die and then force the other half of the die into position. Where pressure

is used, it is always necessary to provide sufficient vents for the rapid escape of the air from the die; these usually consist of very minute holes or slots on the joint surfaces of the die.

No. 2.—Die-casting without pressure is a considerably simpler operation, and is found to be quite satisfactory in very many cases.

No. 3.—Chill casting is resorted to when a completely metal die would be too expensive, in view of the quantities required, or more frequently when the intricacies of the design make the construction of a completely metal die impossible. An instance of this is a piston, the interior of which is so designed that owing to the strengthening or cooling ribs, and the position and size of the gudgeon pin bosses, it is impossible to design a metal core which could be extracted from the casting. In such a case, a sand core can be quite readily inserted into a metal mold.

The construction of the dies is a matter that requires some skill and experience, as not only must suitable material be used, but proper provision must be made for removing the core and mold rapidly while the casting is still hot, as well as for the efficient placing of the runner. In die-making, an important point is the allowance to be made for contraction; large experience is the only true guide, but even with this, it is always the safest plan to make the die on the small side, then correct after making a trial casting. Any other method means much less of time and labor in work thrown away on dies found to be too large.

The best and most durable dies are made of a steel specially alloyed to withstand the continual rapid changes in temperature. Such dies will last for the production of very large numbers of castings, varying from ten thousand to one hundred thousand with the size and nature of the design. When there are small or prominently projecting parts inside the die, then the hot metal necessarily has a destructive effect on such parts, which, however, can be made replaceable, thereby prolonging the life of the die. Some dies are made quite successfully in cast iron, and stand remarkably well; they are not so durable as steel, of course, but being easier to produce, are less expensive, and this is often a consideration of some importance.

The alloys used for the production of aluminum die castings, as in sand castings, vary considerably with the work which the castings have to do. I think, however that it is fairly well established that no zinc must ever be used in the alloy; castings made by this process containing zinc are found to age rapidly; further, such alloys have a destructive influence on the dies. An alloy containing 7 per cent. copper is rather extensively used. All the alloys containing from 6 to 12 per cent. copper work quite satisfactorily. Sometimes manganese up to 1 or 1½ per cent. is added. Alloys containing both copper and tin are also used. In all cases it is of great importance that the metal should be poured into the dies at the right temperature. As the consumption of molten metal for the production of die castings in large quantities is very rapid, it is advisable to keep a reservoir of metal, maintained at a uniform temperature, from which to draw supplies for the dies, and to supply this from the actual melting furnaces.

There is no doubt that the process of die-casting is one that will be developed to an enormous extent, and its benefits will be more and more appreciated as the production of motors for cars and aircraft come to be standardized.

It will be readily appreciated that modification in design, or any tendency to limit the output from a given die, necessarily increases the cost of production enormously by distributing the cost of the die over smaller quantities.

AN ALUMINUM FOUNDRY.

The best results are obtained from an aluminum foundry, as indeed from all other foundries, by the closest possible collusion between the designer and the foundry manager, and afterwards between the foundry and the machine shop. This point, although so frequently emphasized, still sometimes fails to be fully appreciated by manufacturers.

In producing the design, consideration should be given to the possibility of simplifying production in the foundry by avoiding all possible intricacies. There is some tendency to endeavor to reduce machine shop costs by providing for brackets, pipes, oilways, bearing housings, etc., to be cast in position on one casting to an extent which, in view of the greater percentage of scrap castings made in the foundry, and the greater amount of machine shop labor thrown away when a casting is rejected in the machine shop, cannot fail to materially increase the cost in other directions, as well as sometimes seriously interfering with an even flow of supplies; and this latter is a point which all machine shop managers will appreciate, as they well know the disorganization of output which ensues when machines have to stand idle, or to be transferred to other work.

I appeal, therefore, for simplicity of design and greater consideration of the methods which the foundry must apply to produce the article in question.

The other point of importance is that any foundry defect discovered during the machining processes should be immediately reported in detail to the founder, and the casting sent back for his inspection, thereby giving him every opportunity of taking steps in time to prevent a recurrence of the same defect in the quantities of castings which are to follow.

In aluminum castings it is very beneficial to endeavor to keep a fairly uniform thickness throughout the casting.

A small point of interest to machine shops is the importance of getting the best possible value for aluminum turnings or swarf; for this purpose it is necessary to keep the turnings free from dirt and contamination from iron or brass swarf, to use a cutting compound which has no chemical action on the aluminum alloy in question (for this purpose soda must be rigidly avoided), and to dry the turnings as soon as possible after production, thereby minimizing the corrosion caused by the wet lubricant.

When castings are obtained from more than one source, or in more than one alloy of aluminum, see that each is kept carefully separated in the case of any scrap accumulated, in order that the best value may be obtained. It is impossible to identify a variety of alloys of aluminum from appearance, being all white, as can sometimes be done in the case of copper alloys, such as phosphor bronze, gun-metal, or brass. A consignment of scrap aluminum of assorted analysis is of low value compared to one in which the analysis is known and uniform.

PRODUCTION OF ALUMINUM IN 1918.

The value of the primary aluminum produced in the United States in 1918, as reported by the United States Geological Survey, Department of the Interior, was $41,159,225, a decrease of $4,722,775, or 10 per cent. from the value in 1917. The decrease is due very largely to a decline in the price of aluminum during 1918 and does not represent a corresponding decline in output.

BUILDING A CYANIDE COPPER PLATING SOLUTION

A Paper Read Before the Bridgeport Branch of the American Electro-Platers' Society at Bridgeport, Conn., February 14, 1919.

By R. E. Peters.

The problem submitted was to make up a cyanide copper solution which would deposit a sufficient amount of copper, to stand buffing, upon a certain article, or articles, in as short a time as possible.

The first thought, of course, was, "finding a formula," one that was tried and true. That thought suggested another:—that we would be able to find the desired formula in the various text books on electro-plating, or the bound volumes of The Metal Industry. But after several hours of digging into these volumes, we emerged with nearly four-score and ten different formulas, together with warnings of what not to do, and much advice as to what would give the best result. All this left us in a more or less chaotic frame of mind. We sifted these notes carefully, but finally decided to ask the advice of companion counsel, and the following is the formula recommended and tried:

Copper cyanide	3 ounces
Sodium cyanide	2¼ "
Soda ash	2 "
Water	1 gallon

Note:—This formula is supposed to leave approximately 3 ounces of free cyanide per gallon after all metal is in solution.

Our tank had a capacity of 350 gallons, and we desired to find out by actual practice, if the presence of soda ash was necessary, so we started our solution by dissolving 70 pounds of copper cyanide and 50 pounds of sodium cyanide in the 350 gallons. Knowing that we must have a clear solution, we then proceeded to find out how much sodium cyanide would be required to insure complete solution of the copper cyanide, without having any free cyanide present. This was found to be 1.06 parts of sodium cyanide to 1 part of copper cyanide.

There was at this time no rheostat on this tank, so that the full force of 5 volts was used.

The work consisted of thin, round, sheet-iron discs, about 4 inches in diameter, placed in racks holding 60 pieces. The faces of the discs at right angles to the anodes. The structure of the racks and the position of the discs made the complete covering of the work or throwing-in of the deposit to the center of each piece a difficult one. This required at least ten minutes deposition in the old solution, and then the results were not evenly satisfactory.

The deposit obtained in the solution with no free cyanide present was spongy. 36 pounds of sodium cyanide was then added, which showed by analysis, .76 ounces free cyanide and 2.45 ounces of copper per gallon. Work plated in this solution had a heavy dark deposit.

We then added 50 pounds of sodium cyanide, to raise the free cyanide to approximately 3 ounces per gallon. Sample:—2.94 ounces free cyanide and 2.45 ounces of copper per gallon. The deposit was even and bright.

Copper anodes were hung on the cathode bars, same number as on the anode bars and the current passed for approximately 12 hours. Sample:—A loss of .9 ounces of free cyanide and an increase of .21 ounces of copper per gallon. Several racks were then put in, the deposit was bright but uneven, and the work not entirely covered.

One ounce per gallon, or 22 pounds of sodium cyanide were added, raising the free cyanide to 2.68 ounces per gallon. After working the solution for an hour or two we decided that there was too much loss of free cyanide. It had then dropped to 2.63 ounces per gallon. One hour later, it had fallen away to 2.53 ounces per gallon. The copper content remained unchanged. Without current control there was much gassing at the cathodes, together with a strong odor of cyanide and a poor deposit. So it was decided to add the 2 ounces per gallon, or 44 pounds of soda ash to the solution.

A rheostat was installed at this time, but it was impossible to obtain a good deposit at any point on the instrument.

The following morning an addition of 70 pounds of sodium cyanide and 50 pounds of copper cyanide was made, which gave us 2.76 ounces of free cyanide. Several batches of work were plated. A heavy deposit resulted, using 3.3 volts, but the centers were not covered.

15 pounds of copper cyanide were added to cut the free cyanide content, giving us 2.07 ounces per gallon. Upon further working the deposit covered well in 4 minutes, using 2.6 volts for a full load.

The solution now stands 1.97 ounces of free cyanide per gallon. 4.45 ounces of copper per gallon.

At this point we were able to obtain a satisfactory deposit.

We then decided to note the loss of free cyanide from time to time.

A break in our heating-coil with the resultant dilution caused our free cyanide to drop to 1.03 ounces per gallon.

We then plated 1200 steel 5-inch clock-backs for ten minutes at 3 volts, obtaining a heavy, bright deposit, though slightly rough. After plating those clock-backs, we found that the free cyanide had only dropped .01 ounces per gallon.

This showed us that the addition of the soda ash was necessary.

Not content with these results we proceeded to carry out the misleading statement which came with the formula, viz.:—"For Copper cyanide plating the limits on copper and cyanide content in the solution are wide, but ordinarily the cyanide content is not allowed to run more than one ounce per gallon above the metal content." So we proceeded to raise the free cyanide by short jumps from 1.03 ounces, as high as 4.85 ounces per gallon, with the metal content at 3.75 ounces per gallon. At this point we were getting a deposit of sorts and finally nothing.

Then, by reducing the free cyanide and raising the copper content, we finally struck a happy medium.

Our anode surface figured approximately 96. square feet.

The cathode surface, including racks, about 72 square feet.

Records of output for 26 hours of actual working time in this tank showed that 650 racks or 39,000 discs had been plated at an average time of deposition of 2.4 minutes per rack.

During this time the copper content dropped .30 ounces per gallon and the free cyanide had an average drop of .15 ounces per gallon for a full working day. The voltage was 3.0 and the amperage 100.0 per rack at a temperature of 175 deg. F.

After running this tank steadily for several weeks, noting the drop in free cyanide and copper, we found it necessary to make additions of not more than 7 pounds of sodium cyanide, i. e., .30 ounces per gallon per day, and about .40 ounces of actual copper at the end of each week.

This solution has now been working steadily since June,

1918, without giving us any trouble on the many kinds of work which have since been plated in it.

Each morning the free cyanide is determined and the necessary amount of sodium cyanide added. Every Saturday the metal content is determined and the necessary amount of copper cyanide, plus the required weight of sodium cyanide to get it into solution, are added to the tank.

Thus, after many trials and tribulations, a formula was derived which obtained the desired results for this particular work, enabling us to do more work in one solution, in less time than had previously been done in two tanks, and we feel sure that the following formula for a cyanide copper solution can be recommended to anyone as most efficient for all kinds of work.

Seven ounces of copper cyanide or 5 ounces of copper as metal per gallon.

Nine ounces of sodium cyanide. This includes 1.50 ounces of free cyanide, per gal.

Two ounces of soda ash. Only this addition required.

One gallon of water.

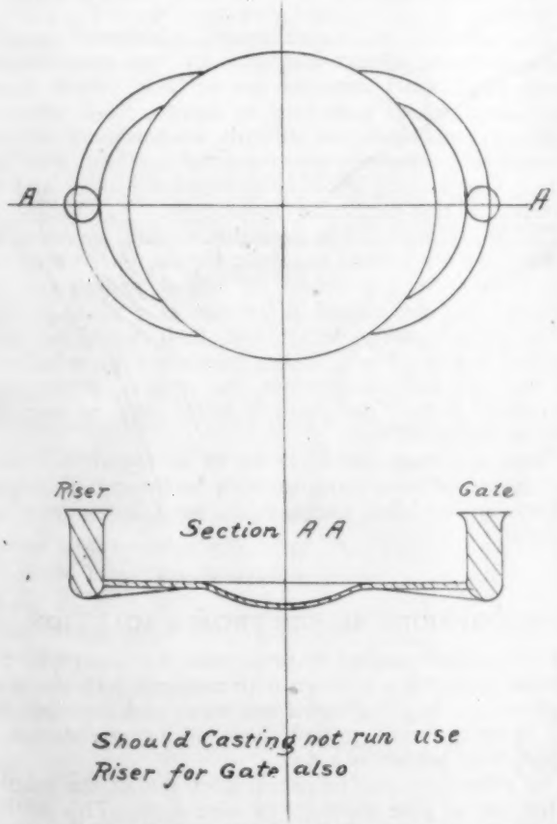
Work at a temperature of 170 deg. to 180 deg. F.

Use from 3 to 4 volts and about 15 amperes per square foot.

IS CASTING CYMBALS A LOST ART?

THE INDUSTRY IS ENDANGERED BECAUSE THE ARMENIANS WHO MAKE THE BEST IN THE WORLD ARE BEING MASSACRED OR DRIVEN OUT OF TURKEY BY THE TURKS

One of the metal products used in this country that has not been given much thought is a cast brass cymbal as used for musical purposes. These cymbals we are informed by Ludwig and Ludwig of Chicago, Illinois, a large manufacturer of drummers' instruments were all obtained from Turkey. Since the war, due to the fact that the Armenians who make these cymbals are being massacred or driven out of Turkey by the Turks, it has been impossible to get them.



W. J. REARDON'S SUGGESTION FOR CASTING A CYMBAL.

What the firm has to say about them is as follows:

"We want to mention now that it is important to not let the art of making cymbals join the ranks of the lost arts in metal industry that have passed away, such as hardening of copper, etc.

"It will be necessary to go into a little detail. The genuine Turkish cymbals are manufactured in or near Constantinople by Armenians. The Armenians are the skilled workmen. They have all been driven out of Turkey or massacred. The Turks are not able to manufacture them and no one else in the world can make them. You may think this a broad statement, but we are in the line and know of the experiments that have been carried on by ourselves and all others in our line. It will be a pity if this valuable article disappears at this time.

"What we are particularly interested in is casting of cymbals such as are used in bands on bass drum. They range in diameter from 12 to 15 inches and ⅛ to 3/16 inch thickness making this a very difficult casting.

"No one in this country is able to make cymbals by the cast process. All American cymbals are spun of sheet brass, but the quality is not nearly as good as the cast cymbals.

"Previous to the war all cast cymbals were imported from Turkey. Unless they can be manufactured in this country, we will have to resume importations of cymbals from Turkey in large quantities. We are very anxious to start manufacturing them in this country and would like your assistance if possible.

"The alloy is 3½ ounces tin to one pound copper, or 78 per cent copper to 22 per cent tin. The difficulty is in casting the cymbal in a large diameter and thin. After casting they are very hard and brittle. We know how to handle the temper proposition if you can help us out on the casting."

The matter was brought to the attention of W. J. Reardon, who reported the following:

"While I have never cast any cymbals, I cannot see any great difficulty in casting them. I have cast a great number of castings 12 to 15 inches in diameter, ⅛ to 3/16 inches thick, but, however, never out of 78 copper and 22 tin.

"This mixture appeals to me as a good running metal and should run without much difficulty. The mixture is very brittle and as you understand, the heat treatment I would suggest the following:

"Use a 17 x 17 flask and No. 2 molding sand tempered with molasses; bar the cope half of the flask so as to assure no sagging. Ram the mold firmly on the outside, not too hard in the center and gate as per sketch. Skin dry the mold; when melting charge the copper and get same good and hot; add the tin in small pieces and stir with a graphite stirring stick; add ¼ lb. of 15 per cent phosphor copper before pouring.

"If you follow these directions closely, I think you will have little trouble.

"Am very much interested in this proposition and will be glad to learn what results you obtain and will try the proposition out myself at the first opportunity."

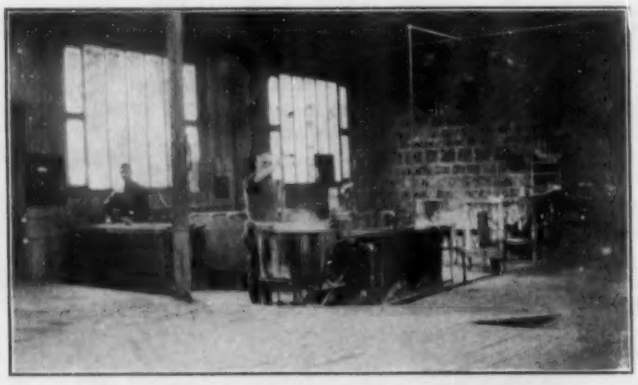
[The Metal Industry would be glad to hear from any foundryman or manufacturer who thinks he can succeed in making these cymbals, as there is business enough to warrant strong effort to save the industry.—Ed.]

A WAR TIME PLATING AND REPAIR SHOP

A Description of the Work Required to Keep the Medical Department Up-to-date.

Written for The Metal Industry by Sergeant Joseph Haas.

This war has indeed brought about changes in regards to the purposes for which soldiers are used. There was a time when it was considered that the only business for soldiers was to kill or be killed. Of course, this conception still exists as the business of ninety-nine per cent. of the soldiers, but it has also been found that it is necessary to save the life of a soldier. Once a man has been injured, he may not be in the same physical condition, he may have one or two glass-eyes, he may have parts of his bones held together by metal. All this has been accomplished by our skillful surgeons and doctors. Doctors, however, must be given plenty of material and apparatus in order to perform these things and the material must also be in good condition. Often a particular



SERGEANT HAAS, WITH HIS HELPER IN THE WAR TIME PLATING SHOP IN FRANCE.

form of apparatus or a device to meet a particular case has to be made, and when no such device has as yet been made, the surgeon or doctor is handicapped and the patient's chances of life are materially decreased.

Such has been the foresight of the United States Government by bringing men who had experience in the optical, surgical, dental and medical supply together, organizing them and subsequently sending them to France in the form of a Repair Shop Unit. Stuck away in a part of France, seemingly unimportant, but still important from the standpoint and enthusiasm that medical officers of high rank have exhibited, is a factory, as complete as could be desired in the nature and variety of the equipment and the skill of the men. A factory that has its machine shop, forging, lathe, polishing, plating, glass-blowing, X-ray, optical departments, with the necessary bench workers.

In order to get an idea of the nature of the work one has only to mention that surgical and dental instruments of all kinds are repaired; some, of course, only have small repairs, while others are so badly damaged that parts have to be brazed. Irrigators, tube-cocks and operating knives are among the articles made by the hundreds, while stretchers, operating-tables, sterilizers and gas tanks are repaired, dental and optical mirrors are resilvered.

The optical department fits out men with artificial eyes, so perfect that one has difficulty in distinguishing which eye has been lost. Men, who have had their eyes weakened are fitted out with eye-glasses according to prescription free of cost. From this one can see that necessary machinery has to be had in order to make eye-glasses from the raw material to the finished product, through the various processes of grinding, polishing and trimming.

The scientific and experimental department is called upon to make electro-magnets for the extraction of pieces of shrapnel from the eye or body. This department also makes, according to design, head braces to assist in the healing of difficult fractures of the jaw, which would otherwise prove painful and heal with difficulty. One cannot begin to estimate the value and importance of this particular department.

The X-ray department performs its duty by fitting out ambulances for mobile hospitals for the purpose of taking X-rays at the front. If these ambulances are damaged they are turned in for repairs.

The glass-blowing department, besides making apparatus of various kinds, makes temporary glass-balls for the eye, so as to accustom the optical nerves to a "stranger" before the man is fitted with an eye that matches his good one.

There are many repair shops to be found in France, each for a different purpose, such as for repairing typewriters, automobiles, motorcycles, band instruments and so forth.

*Mr. Haas is now a sergeant in the Overseas Surgical Instrument Repair Unit with the American Expeditionary Forces in France.

RECOVERING SILVER FROM A SOLUTION.

The quickest method to precipitate the silver out of a solution is to throw it down with muriatic acid and when all the silver is precipitated out wash and dry and then melt in an ordinary graphite crucible, using soda ash or carbonate of potash as a flux.

The silver can also be precipitated out of the solution by the use of zinc shavings or zinc dust. This method throws the silver down in metallic form, but in order to remove the zinc you would have to dissolve the entire precipitate in muriatic acid and the silver would be left in a pulverent form which could be melted down as mentioned above.

Another method would be to deposit the silver out by using steel or carbon anodes and sheet steel on which to deposit the silver, and by adding a small amount of cyanide to keep up reduction the silver could all be deposited out of the solution. The silver could then be melted from the steel with a Bunsen flame.—C. H. P.

EDITORIAL

Vol. 17 New York, March, 1919 No. 3

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PROHIBITION AND METALS

The claim that prohibition as far as it concerns liquors of high alcoholic content will prove a boon to the metal worker admits of no negation. Mr. A. F. Shore, however, in a letter published in The Iron Age for February 13, 1919, undertakes to prove in a scientific manner that alcohol is more than a medical necessity, that it is also a moral, social and religious necessity. He says:

"Science can prove under its latest discoveries that alcohol is more than a medical necessity to human life, but not necessarily to animal life. Also that only impure alcohol acts as a nerve paralyzant upon which the major part of past indictments of this agent has depended." All this in spite of overwhelming evidence to the contrary! Laboratories and medical associations all over the country have definitely proved that alcohol is not necessary to human life, but on the other hand, it is a heart depressant, is detrimental as a beverage to the human economy and its use as a stimulant, tonic or food has no scientific basis.

Mr. Shore goes on: "Alcohol as a common necessity to human life could not be prohibited under the pretext of morality, only immoderate use could consistently come under this head, and that local authorities obviously can best control." Here is the crux of the matter. National prohibition passed by federal and state legislatures will remove all questions of local control. This method of regulation has been tried and found wanting, so why not try out absolute and National control? Also he says: "As a human necessity, it can be shown that complete prohibition of alcohol by statute would, in the nature of things, never be feasible." But he does not show how!

From personal observation extending over a number of years, of men employed in brass mills and foundries, we are able to state that the men who were most addicted to the use of spirituous drinks were the ones who gave out first under stress. Beginning with the casting shop or melting room, if any extra exertion was needed the drinking men failed first. In the rolling mill and finishing shops the same rule held true. This was particularly so in the summer time when the temperature was high, the drinking men were always the first to give up.

The argument that is repeatedly being put forth in favor of the sale of liquor that the "saloon is the workman's club," does not carry much weight. In the first place why should the workman's family suffer from want of food and clothing while he revels in the "pleasures offered by a mahogany bar." If temptation was not there the workman would find comfort and solace in his family. Once tempted a man falls and finally the use of liquors becomes a habit and he firmly believes it to be necessary for his very existence. That the drinking of spirituous liquors is not necessary, not conducive to good work, we believe has been

proved in a striking way by the exigencies brought about by the war. It has been stated that a laboring man or one doing manual work needs some stimulation after his day's work. If this is so, why does not the argument apply with equal force to women workers. We have always had thousands of women at work in factories and the war brought many more thousands into the ranks. But in spite of this we hear of very little indulgence by women in the use of intoxicants except in those cases where it is done by invitation and encouragement of the masculine brute.

The best thing that can be done for the working man is, as suggested by The Iron Age, to supply him with a place to loaf in and if he can take his family with him, so much the better. This scheme has been and is being carried out in various parts of the country by large industrial organizations with great success. Such concerns as the General Electric Company, National Cash Register Company, Westinghouse Electric and Manufacturing Company, Rome Brass and Copper Company, Bristol Brass Company, Scovill Manufacturing Company, have gone into the social club question quite thoroughly and are well satisfied with the results.

CASTING CYMBALS

A startling condition of affairs in regard to the production of musical instruments in this country is revealed in the article on Casting Cymbals in this issue of THE METAL INDUSTRY.

The massacre of the Armenians by the Turks, it is claimed, has endangered the existence of the art. We are told that the Armenians made the best cymbals in the world and that while we make them here, we spin or stamp the metal instead of casting it, and that our cymbals are in consequence inferior. This should not be. What the Armenians can do we should be able to do and we know we can! Mr. Reardon's idea looks good and we are very anxious to have him try it out and see what can be done. We know that the firm mentioned, Messrs. Ludwig and Ludwig, will be very glad to co-operate with any one who will try to make a cast cymbal. We will need plenty of them in the days to come as the boys from "over there" come home, for a band cannot play without a cymbal and a theatre orchestra is lost without it. What have the brass casters got to say about it?

CORRESPONDENCE AND DISCUSSION

While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

ECHOES OF THE WAR

TO THE EDITER OF THE METAL INDUSTRY:

The soldiers behind the lines, known as the Service of the Rear and also the Service of Supplies were not given much recognition in the great war, but they are really the backbone of the army. The cavalry did not have much chance for active service due to the fact that it was a scientific war and the fighting areas contained trenches, barbed wire entanglements, shell holes, etc., so that it made it impossible for the cavalry to get into action, that is, in real cavalry formation. Of course the cavalry was used as dispatch bearers at the front and also for patrol duty, both of which services are dangerous. The mounted troops or regiments that engaged in this war have gained only platoon, squad or troop laurels. Dispatch bearers get individual recognition for some exceptionally hazardous ride or other service.

I believe that what I have written regarding the cavalry is enough to give even the most uninitiated an insight into its services.

The regiment, 3rd United States Cavalry, left its home station at San Antonio, Texas (Fort Sam Houston), on the evening of October 11, 1917, traveling by rail, without horses, to Philadelphia, the port of embarkation. On arrival we were immediately put aboard the S. S. *Northland*, and on the morning of the 16th started on our trip across. The steamer put in at Halifax for a lay-over, for military purposes only, as we were not permitted ashore. We left Halifax after a forty-eight hour lay-over and started on the long lap of our journey on October 19. The trip across was uneventful as far as submarines were concerned. However, we encountered very rough weather for two days. We arrived in Liverpool on November 1, 1917, none the worse for the trip and proceeded to Camp Borden where we remained for two days. From Camp Borden we went to Southampton and then across the English Channel to Le Havre, France, where we arrived on November 5. We encountered very poor camp conditions at all of the rest camps mentioned.

After a few days' rest we left for La Havre and arrived at Londrecourt, Meuse, on November 8, and started to work at once, work of a nature that was unexpected, especially for cavalry. The entire regiment did not come as far as Londrecourt as two squadrons were dropped along the road at other points for duty, so there was only one squadron at Londrecourt. Our squadron relieved three detachments of marines of road building, barrack building and other engineering work. After four months the camp had grown to the size of a small town and at the end of the war was one of the most important schools for officers and enlisted men for instruction in trench warfare. Our next move was to Neufchateau, Meuse, a fairly good sized town. At Neufchateau we were given work of a far different nature than we had already had and work that would interest a horseman, even though of an unpleasant nature. This was the care of wounded and mangy horses, besides the other diseases of the horse.

We stayed at Neufchateau for about three weeks and then moved on to a village called Le Valdahon, some distance from either of the two mentioned towns, but within a short distance of the Swiss border. Le Valdahon was very small but to offset this there was an excellent post, rather isolated perhaps, but a good place to soldier. Our troops, G and H, were practically the only occupants for some time, with the exception of three detachments of American artillery. We had plenty of work to do here, hard work, too, for the post had been converted into a remount station. There were about two thousand horses quartered here, and troops G and H had the care of this large number of animals. After about three weeks more help came in the form of Second Cavalry, consisting mostly of green men. After getting things in good running order at Le Valdahon, Troops G and H were given a rest of nearly two months, in the form of doing Military Police duty. Troop H was split up into platoons and were sent to three different towns to do this work. We assembled next at Long, Neuvre, a hamlet of seven or eight houses and nothing else but fields and woods. Troops G and H occupied this place and immediately proceeded to build barracks, and after eight weeks eleven buildings had been completed and twelve more were under way. After four months there was a camp that could accommodate 2,000 men and nearly 5,000 head of animals, and it is one of the largest remount stations in France.

As I write this letter we are under orders to rejoin our regiment for probably border duty.

Private GEORGE STOUTENBURGH,
Troop H, 3rd United States Cavalry,
American Expeditionary Force.

December 10, 1918.

[Private Stoutenburgh was a metal worker with the Scovill Manufacturing Company, Waterbury, Conn., previous to entering the service.—Ed.]

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating-Chemical

ALLOYING

Q.—I should be glad if you would tell me the composition of a light aluminium alloy which will withstand water pressure of 10 pounds per square inch. We have been using a mixture of 10 per cent copper, 2 per cent tin, balance aluminum, but have had trouble due to sponginess and blowholes, causing the castings to fail under the water test. The casting is in the form of a hollow truncated cone, about 18 inches high, base 8 inches diameter, top 4 inches diameter. The walls are required to be 3/16 inch thick when finished. We have cast these various thicknesses from 5/16 inch to ½ inch, but have not succeeded in removing the porosity. We have taken the precaution to use a pyrometer to obtain the correct pouring temperature, but it seems likely that the composition of the alloy is wrong, and I should be much obliged if you could suggest a better one.

A.—The following alloy, as recommended by the American Society of Automobile Engineers, should answer your purpose. It is a light alloy possessing strength, but little ductility, has a close grain, and can be cast sound free from blowholes:

Aluminum, not less than 80.00 per cent.
Zinc, not more than 15.00 per cent.
Copper, between 2.0 and 3.00 per cent.
Manganese, not more than 0.40 per cent.

Total impurities should not exceed 1.65 per cent, of which not more than 0.50 per cent should be silicon, not more than 1.00 per cent iron, and not more than 0.15 per cent lead.—W. T. F. Problem 2,673.

CASTINGS

Q.—We are having trouble running a yellow brass ring 15 inches in diameter and 1½ inches high, with a 14-inch hole in it. It seems to come "cold shot" and dirty when turned up and the castings look very bad. We would appreciate it very much if you would give us some idea as to how to gate these castings.

A.—Yellow brass, especially if very high in zinc, is sluggish when melted and drossy. It also has a high shrinkage. A mixture contining copper 76, tin 3, lead 3, and zinc 18 is about as low in copper as you can go without having difficultiy in getting clean castings or being compelled to use special precautions.

The casting you mention can be made in the form of a pot, four or five rings high. The pot should be bottom poured using a skim gate. The pouring gate may be located in the core or center of the mold. Four very heavy risers will serve to feed the pot. As the pot is to only have ½ inch walls, the risers should not be placed directly on top of the pot but cut into the top portion from the outside. Increasing the height of these risers puts added pressure on the pot and makes it easier to secure a casting free from blowholes. In cutting up the pot into rings of the desired size it may be necessary to discard the top ring as these may be shrink spots where the risers join the casting.

Care should be observed to ram the core of the pot firmly, but it should not be too hard as even the mixture given above has quite a shrinkage and if the core is too hard the casting may crack outright or contain numerous small hair cracks. Good, clean ingot brass, free from dross and iron and well skimmed, should be used for a job of this kind.—J. L. J. Problem 2,674.

COLORING

Q.—Why is it that after articles have been colored dark green in a solution containing arsenic, the background is brown instead of black? If you recommend carbonate of lead how should it be used?

A.—You will find that lead will give you a more permanent color than arsensic in dark green gold coloring. Arsenic is what may be called a fugitive metal and it gradually fades away, leaving a brown or grayish tint instead of a permanent color. You can use either dry lead carbonate or litharage which is an oxide of lead, in the place of the arsenic. Use stick caustic soda for the solution. Dissolve from 4 to 6 ounces in a pint of warm water (not too hot) and then dissolve all the carbonate of lead or litharge it will absorb and use this as a stock solution. Filter before using.—C. H. P. Problem 2,675.

FLUXING

Q.—I should be glad if you could give me a suitable flux for gun-metal, as I have a large quantity of Admiralty gun-metal, which is oxidized. Also what should be the color of the flame from a tilting oil furnace, if the oil and air pressures are correct? I am getting a lot of metal oxidized in the oil furnace. Would this be due to too much air At present the flame is green, without much smoke. We are using paraffin oil as fuel.

A.—The best way to treat your Admiralty gun-metal is to melt in graphite crucibles, using a liberal covering of charcoal, and to add from 1 to 4 ounces of 10 per cent phosphor-copper per 100 pounds of metal. This will reduce oxides, and give a sound alloy free from entangled oxides, as shown by absence of discoloration from the fracture surface.

When working correctly your oil furnace should have a short, clear, white flame, and no smoke should issue from the furnace mouth. The green color of the flame is due to copper and its oxide.—W. T. F. Problem 2,676.

GALVANIZING

Q.—Since moving into our new shop we find it impossible to get good results from our galvanizing solution, a black deposit forming on all the work in very short time. Can you suggest a remedy for this trouble?

A.—While it is difficult to decide just what is wrong with the galvanizing solution which causes the black deposit, we should imagine that the solution is slightly deficient in reducing and conducting salts, if it is an acid solution.

We would suggest first the addition of ½ ounce of sulphuric acid per gallon of solution. If this addition slightly improves the solution then add 1 to 2 ounces of sal ammoniac per gallon as a conductive agent. A small proportion of aluminum sulphate improves the color of the deposit, producing a whiter tone. If necessary add ½ to 1 ounce of the aluminum sulphate per gallon. Occasionally add 2 to 4 ounces of zinc sulphate per gallon of solution to keep up the metal content.—C. H. P. Problem 2,677.

JAPANNING

Q.—We have had considerable difficulty in japanning buttons for glove fasteners and the process is very expensive, and we would ask whether you can give us any enlightenment as to the best process to use to produce black and various colors on these buttons?

A.—We are not familiar with the methods you now use for japanning the glove buttons, but in our opinion these buttons should be japanned in two tumbling operations with the correct type of tumbling barrels and the correct grade of japan and it should not make any difference what the color may be—black or otherwise.

A vertical iron tumbling barrel would be the best and the speed of rotation could be determined by experiment, but about twelve revolutions per minute would be about right. On the inside of the barrel and spaced at intervals should be arranged half steel tubes, that is, a steel tube sawed in two. These half tubes must have a downward angle towards the bottom of the tumbler and extend within six or eight inches of the bottom.

The advantage of this arrangement is that the buttons are picked up as the barrel revolves and continually fall in a stream or, in other words, a double tumbling action is obtained. This method is used in tumbling metal buttons.

The amount of japan required to cover a certain number of buttons must be figured out so that the japan will not be in excess. Drying must take place between the two japanning operations.—C. H. P. Problem 2,678.

PLATING

Q.—We should like your advice in regard to nickel or silver plating bronze castings which have small pin holes and which holes have been filled with pure tin. We have found that in the silver plating, or nickel plating of these castings, the tin does not take the same color as the bonze. This we should like to overcome.

A.—Tin is a very soft metal, and unless care is used in cleaning the bronze castings, which contain the pin holes filled with tin, the spots become dull and show up in the finished nickel plate.

In order to overcome the trouble the preliminary cleaning should be with gasoline or benzine; the articles should then be dried out in maple sawdust and then cleansed in a mold alkali cleaner which will not materially affect the tin spots, and which is composed of the following:

Water	1 gallon
Tri-sodium phosphate	4 ounces
Soda ash 58%	4 ounces

The solution should be maintained at nearly the boiling point, 200 to 212 degrees Fahr. Immerse the articles in the cleaner for a few seconds then wash thoroughly in cold water and immerse in the regular cyanide dip.

Water	1 gallon
Sodium cyanide	8 ounces

This dip removes any oxide formed on the castings in cleaning. Wash the castings again in cold water and nickel plate as usual. If the tin spots still show up then it will be advisable to copper plate them. A copper solution should consist of the following materials:

Water	1 gallon
Sodium cyanide	3½ ounces
Copper cyanide	3 ounces
Soda ash	3 ounces
Hyposulphite of soda	⅛ ounce

Temperature 110 to 120 at 3 volts.—C. H. P. Problem 2,679.

MIXING

Q.—We have a shaft which is 6½ inches in length and 4 inches in diameter to make of manganese bronze. As we have not had very much experience in casting this alloy, will you please state what would be the best analysis for us to use and whether we should get some manganese copper and put a certain percentage in after we get the metal melted?

A.—An article of this kind should be made from forging manganese bronze. The analysis of this alloy is as follows:

Copper	57.35
Iron	1.40
Manganese	.05
Tin	1.20
Zinc	40.00

Cast in iron molds, discard about 5 per cent, from the top of the casting, rough turn and then forge to size. The castings may be heated in any suitable heating furnace or in a blacksmith's forge, but care should be exercised not to overheat the metal as it has a rather low melting point.

It is of course possible to cast the shaft in an ordinary green sand mold from the casting grade of manganese bronze, but from an engineering standpoint, the casting will be far from reliable or satisfactory. A casting of this length and diameter made from an alloy of high shrinkage like manganese bronze (even if cast one end) is certain to contain hair cracks or areas that are spongy.

The required amount of manganese may be added in the form of manganese copper if it is so desired.—J. L. J. Problem 2,680.

OXIDIZING

Q.—We have a number of thousand of zinc pieces about 2 inches in diameter and 1/16 inch to silver oxidize. When these are handled, possibly 10 to 15 at a time, they work out very satisfactory, but due to the large number to be plated we find that a rather slow method. If the articles were of brass, several hundred could be wired up at one time and handled satisfactorily.

A.—Zinc may be silver oxidized by the following method: Polish the articles or scratch-brush them as desired for a basic finish. Clean in a mild alkaline solution so as not to oxidize the zinc, using the following solution. The excess of buffing dirt should be previously removed with gasoline or benzine.

Water	1 gallon
Tri-sodium phosphate	4 ounces
Soda ash 58 per cent	4 ounces
Powdered yellow resin	¼ ounce

Temperature 180 to 200 degrees Fahr.

Then wash the articles in cold water and plate in a warm copper cyanide solution for a few minutes.

Water	1 gallon
Sodium cyanide	2¼ ounces
Copper cyanide	2 ounces
Soda ash 58 per cent	1 ounce
Caustic soda 76 per cent	¼ ounce
Bisulphite of soda	½ ounce

Temperature—120 degrees Fahr. Voltage—3.

If you maintain a brass solution, plate the zinc with brass, because it will be found that the brass deposit will amalgamate more readily than the copper. After copper or brass plating for at least five minutes, then wash thoroughly in cold water and immerse in a mercury dip for a second or two until the copper or brass is uniformly coated with a film of mercury.

Water	1 gallon
Sodium cyanide	6 ounces
Bichloride of mercury	½ ounce

Dissolve the mercury separately in a little hot water before adding to the cyanide solution. If the mercury does not cover quickly and uniformly, increase the mercury in small proportions. After immersing in the mercury, dip wash thoroughly and silver plate as usual. If these methods are followed we see no reason why zinc cannot be plated as successfully as brass. After silver plating, oxidize directly in a hot solution (160 degrees Fahr.), consisting of

Water	1 gallon
Polysulphide	1 to 2 ounces
Water ammonia	⅛ ounce

It would be better still to oxidize the articles by the cold process, as follows: After silver plating, wash in cold water and then flash in a warm copper solution for a second or two, then remove and immerse in a solution as above, but instead of using it hot, use it cold. One ounce of polysulphide should be ample per gallon of water.—C. H. P. Problem 2,681.

REFINING

Q.—Will you kindly tell us how to procure platinum from platinum filings, iron filings and sand?

A.—If the quantity of sand is large, a preliminary concentration should be effected by agitating the mixture in a suitable vessel, and from time to time pouring off the water with the sand in suspension. This overflow should not be allowed to go to waste before examining the settled sand by means of a powerful hand-glass for platinum. If small particles of platinum are still present in appreciable quantity, the residue should be dried and ground fine and again levigated, as in the first instance. The residue from the first levigation, after separating all the sand possible, should be dried and fused with sodium carbonate (soda ash) charcoal and red lead. Trial assays will be necessary in order to determine the correct proportions. The lead obtained from this fusion could then be sold to the refiners. The iron filings from the original mixture may easily be removed by means of a magnet.—W. T. F. Problem 2,682.

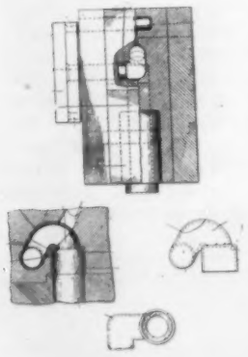
PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

The age of these patent notices is due to the delay in the issuing of patent reports.—Ed.

1,286,654. December 3, 1918. **Intricate Tubular Casting and Method of Making Same.** John Kralund, of Brooklyn, N. Y., assignor to Doehler Die Casting Company, of Brooklyn, N. Y.

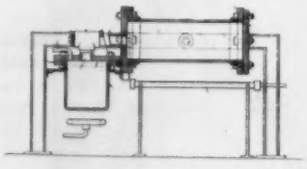
This invention relates to the manufacture of tubular castings, particularly die-castings of such intricate shape that the same cannot be produced by die-casting methods previously in vogue. By this invention the inventor produces tubular die-castings containing bends or elbows therein of such a nature that cores for the same, if used, could not be drawn after the metal was cast. He produces such castings by using tubular cores, which are themselves preferably die-castings, and positioning the same within the mold cavity in proper relation thereto. He uses solid movable cores to close the outer ends of the tubular cores thus positioned, and to form end portions of the finished casting. When the parts are thus positioned, the desired casting is made within the mold about the tubular member or members and the solid movable end cores, the latter being drawn after the metal has sufficiently solidified.

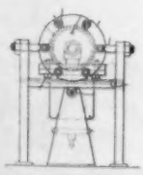


1,287,653. December 17, 1918. **Process of Manufacturing Metallic Phosphides or Alloys Rich in Phosphorus.** Paul E. Demmler, of Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Company, a corporation of Pennsylvania.

This invention relates to processes of manufacturing metallic phosphides and alloys rich in phosphorus, such, for instance, as phosphor-copper, phosphor-tin, phosphor-zinc, and the like.

The object of the invention is to provide a process of the above indicated character whereby a large quantity of phosphoric material may be produced by simple, compact and inexpensive means and whereby the necessity for handling phosphorus while hot or in the vicinity of heated crucibles, or other parts, is avoided, so that the process is relatively safe and not injurious to the operators while substantially no loss of phosphorus occurs, with the resulting greater economy.





One form of apparatus which may be employed in practising the process is shown in the accompanying drawing, which is a longitudinal sectional view of the apparatus.

1,287,605. December 17, 1918. **Solution for Rust-Proofing Iron and Steel.** William H. Allen, of Detroit, Mich., assignor to Parker Rust-Proof Company of America, of Detroit, Mich., a corporation of Michigan.

This invention consists in mixing an acidic oxid salt of an alkali metal (such as the chromate, dichromate, manganate or permanganate of potassium or sodium) or of an alkaline earth metal (such as chromate, dichromate, manganate, or permanganate of calcium, magnesium, barium or strontium) with phosphoric acid, which mixture may be dissolved in water.

A stock solution is usually prepared and used as required. To produce the solution, the chromate, dichromate, manganate or permanganate is mixed with the phosphoric acid and water in such proportions that the one hundred parts of solution consist of approximately .1265 parts of available oxygen, 50 parts of phosphoric acid and the remainder of water. When sodium dichromate is used the amounts are—

Sodium dichromate	.785 pounds
Phosphoric acid (75%)	66.6 pounds
Water qs. to	100.00 pounds

One-half pound of potassium permanganate may be substituted for the sodium dichromate in the above formula.

1,288,035. December 17, 1918. **Composition of Matter for Use in Foundry Practice.** F. S. Knapper, Springfield, Ohio.

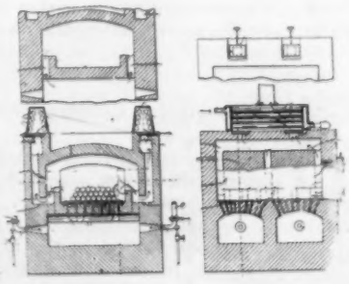
This invention relates to composition of matter for use in foundry practice and has for its object to produce a composition of matter suitable for use in making follow boards and patterns which will be capable of being molded to the form or shape desired while in plastic condition and when dried will retain the shape or form to which it has been molded and will be sufficiently strong to stand without breaking or change of form or shape repeated use under the jarring action of the molding machines.

The composition of matter of the invention is made up of sand, Portland cement, graphite or plumbago and litharge mixed together with linseed oil to form a plastic mass. The composition is made in the following proportions: About 50 parts sand, preferably sharp sand, such as that known as Cape Race about three parts of Portland cement, about three parts of graphite or plumbago in powdered form, about one part of litharge and 12 to 15 parts of linseed oil, preferably boiled oil, sufficient oil being used to cause the composition to hold together in a plastic or semi-plastic mass.

The sand and other dry ingredients are first thoroughly mixed together and the oil then added and the whole worked over until the oil is thoroughly incorporated so that the mass is uniform throughout.

1,288,202. December 17, 1918. **Metal Heating Furnace.** Walter S. Rockwell, of New York, N. Y., assignor to W. S. Rockwell Company, of New York, N. Y., a corporation of New Jersey.

This invention relates to that class of furnaces employed in heating objects of various kinds in the operations of annealing, reheating, &c., particularly to furnaces in which the spent gases are discharged upwardly.



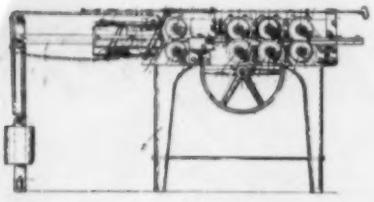
In the present invention the charge of material is placed upon the working-floor of a heating-chamber, and a combustion-chamber is arranged below the heating-chamber and flaming-gas passages are extended therefrom into the heating-chamber at a series of points in the floor of the chamber along the side-wall of the same.

The outlets or vent-openings from the heating-chamber are also formed near the floor of the said chamber at a series of points along its length.

By this arrangement, the floor of the heating-chamber is effectively heated, which is not always effected when the flaming gases are introduced through the side, or end of, or over the heating-chamber.

1,288,603. December 24, 1918. **Tube-Forming Machine.** F. J. Jarecki, Grand Rapids, Mich.

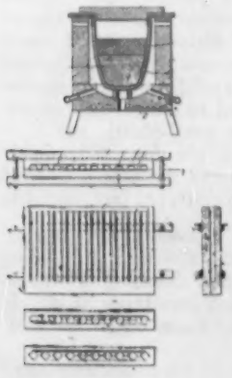
This invention relates to a metal forming machine, it being a primary object and purpose of the invention to produce a machine in which strips of flat metal may be formed into tubes and a joint made at the edges of the metal which is absolutely locked against separation and at the same time formed so that the finished tube presents on its outside a smooth surface without any ridge to indicate the position of the joint or seam, the machine also being adapted to make many other forms. A further object of the invention consists in the provision of means for withdrawing the tube or other structure from the machine, this withdrawing means rendering it possible to make tubes, or the like of, any length and not requiring long strips of metal for operation of the machine.



1,290,011. December 31, 1918. **Process of Making Castings of Rare-Earth Metals and Their Alloys.** A. and M. Hirsch, of New York, assignors to Alpha Products Company, of the same place.

The invention relates to improvements in the manufacture of castings of rare earth metals and their alloys and especially to the preparation of the metals for casting. The improvements are particularly adapted to the manufacture of castings of alloys of cerium or lanthanum for sparking purposes.

The present process has for its object the providing of improvements, as shown in cut, whereby the rare earth metals and their alloys may be satisfactorily cast in the various forms desired in commerce and, in many cases, with sufficient exactitude of size to avoid the necessity of machining, thereby avoiding not only delay and expense, but much loss of material, which, once powdered, is extremely difficult to recover in usable shape. Also, according to the present invention, the cast metal or alloy is obtained in a most simple and economical manner and substantially free from objectionable impurities.



1,289,260. December 31, 1918. **Machine for Coating with Metal.** Joseph Powanda, Ansonia, Conn.

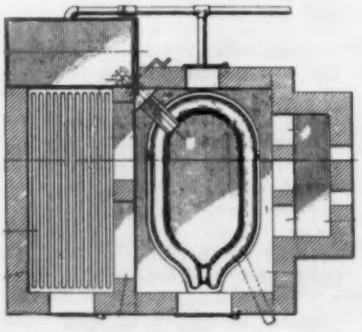
This invention relates to machines for coating sheet metal, but is particularly devised for tinning sheets on one side, although capable of tinning sheets on both sides.

In order that my invention may be better understood by those skilled in the art the inventor has embodied the same in a machine, as shown in cut, which not only comprises instrumentalities to effect the tinning operation proper, but also a bath for cleaning the opposite side of the sheet and a series of instrumentalities for washing, drying and clipping the edges of the sheet, whereby the machine delivers the sheet in a condition ready for the market, either cut in lengths or reeled in coils. The detail mechanism embodying the invention for tinning the under side of the sheet may not only be utilized in this particular machine but also in tinning machines generally wherever applicable.

1,290,242. January 7, 1919. **Melting and Pouring Furnace.** Ignac Kormuth, Charleroi, Pa.

This invention relates to melting and pouring furnaces especially adapted to be used for melting and pouring lead and similar metals.

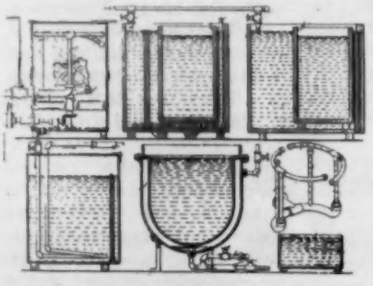
An object of the invention is to provide a furnace of the character stated having means for gathering the poison gases which emanate from the material during the process of melting and pouring, there also being means for conveying the said poison gases away from the furnace thereby preventing them from coming in contact with the operator and eliminating the dangers and damage incident thereto.



With this object in view the furnace comprises in a unitary structure a fire box, as shown in cut, having an oven positioned at one end thereof, the said oven being adapted to contain the material which is melted. A pouring chamber is located adjacent the fire box and a ladle is pivotally mounted therein. A trough is provided for conveying the molten metal from the oven to the ladle and means are provided for moving the trough.

1,290,952. January 14, 1919. **Process for Cleaning Metal.** Herbert E. Finlay, of Detroit, and Frank Leroy Fangboner, of Royal Oak, Michigan, assignors to Burroughs Adding Machine Company, of Detroit, Michigan, a corporation of Michigan.

This invention is designed more particularly to provide for cleaning machine constructions and parts and removing rust therefrom. Prior to this invention it has been common to pickle metal parts in a solution of hydrochloric acid or the like for the purpose of removing rust and subsequently washing the same as a preliminary to coating the articles with a plating metal, enamel paint, japan or the like.



In some instances the bath in hydrochloric or muriatic acid has been followed by a dipping in nitric acid, but this separate step has the disadvantage that it leaves the metal in a discolored condition. Whether the muriatic acid alone or muriatic and nitric acid are employed the acid penetrates the pores of the metal, is not thoroughly removed by the subsequent water bath and ultimately causes the article to rust.

In the improved process the acid bath or pickling is followed by a bath in cyanid of potash or the like which neutralizes any acid present and thereby counteracts the tendency to rust due to the acid working out of the pores of the metal after treatment. Other features of the invention will be understood from the drawings accompanying.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

THE METAL INDUSTRY assumes no responsibility for statements made by manufacturers in articles in this department.

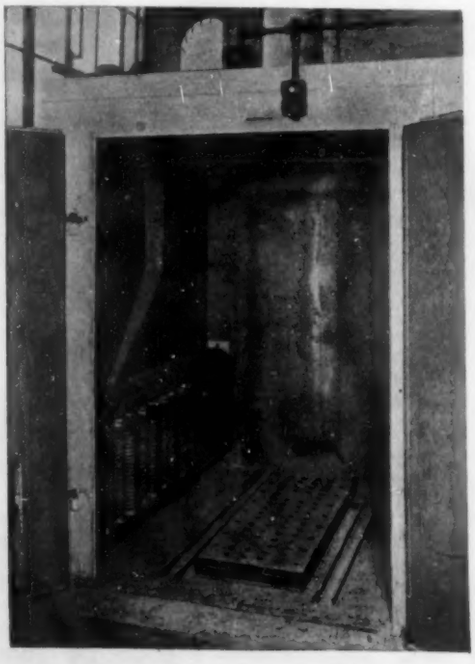
ELECTRICALLY-HEATED OVENS

By D. H. COLCORD, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa.

The electrically-heated oven claims all of the advantages now recognized as having been obtained in the application of electricity to industrial plants in the various forms of power, i. e., economy of operation, reliability of service, increased production, ease of operation and safety.

The inner walls of an enameling oven, which is essentially a heat insulated room, consists of thin sheet metal and the insulator may consist of powder, blocks or bricks. In the cases where powder or blocks are used, the insulator must be placed between an inner metal lining and an outer lining, thus practically constructing one sheet metal box within another. An insulator is placed in the space between the two. The wall is built up around the inner metal lining in the same manner that masonry brick is laid, when insulating brick is used.

Up to the time that electricity came into use for enameling,



HEATERS ON SIDE WALLS ONLY, VENTILATION AT SIDES AND IN FLOOR.

almost no attention was paid to the kind of thickness of insulation, or oven construction in general, so far as retaining the heat in the oven was concerned. The reason for this was that gas being a very cheap fuel, it was not considered necessary to go to any particular expense to obtain an oven having good heat-insulating qualities. It was very seldom that one would see an oven with two inches of insulation, one or one and one-half inches being the rule. Moreover, this insulation was of a very poor quality.

The ovens may be classified under four general divisions as follows:

Kiln-type oven, hand-operated;
Kiln-type oven, truck-operated;
Semi-continuous conveyor-type oven;
Continuous conveyor-type oven.

The hand-operated kiln or box oven, consists of an insulated room into which the work or the parts to be baked are carried by hand and hung up in place on suitable racks or hooks.

The truck-operated kiln, or box-type, oven, consists of an oven similar to the hand-operated on trucks which are wheeled into the oven and which remain in the oven with the work.

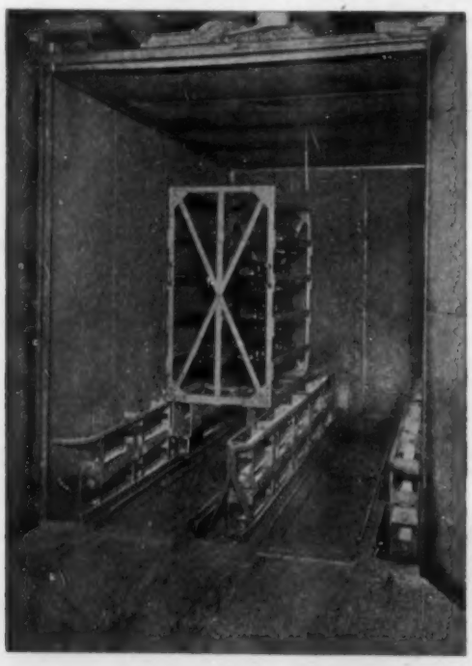
The semi-continuous conveyor type oven consists of an oven having doors at both ends, with an overhead conveyor running directly through the oven. This conveyor usually consists of a continuous chain which passes through the oven and returns over the top of the oven. With an oven 20 feet long, the conveyor would extend in a horizontal plane at least 20 feet on either end of the oven. A batch of work is dipped in the enamel and hung on the conveyor to drip for approximately 15 or 20 minutes. After this period the conveyor is started and the work moved into the oven. During the time that it takes the first batch to bake, the second is being dipped and hung on the conveyor. When the first batch is baked the conveyor is started up, the first being carried out and the second batch put into the oven. A third

ENAMELING OVEN, SHOWING HEATERS ON WALL BEHIND PROTECTING SCREEN.

batch is then dipped and hung on the conveyor, while the second batch is being baked, and the first batch removed from the conveyor. The operation is continued indefinitely.

A continuous conveyor type oven consists of an oven having a conveyor running through, which operates continuously and not intermittently as in the case of the semi-continuous conveyor type. The work is hung onto a moving conveyor or chain and carried directly into the oven. The speed of exit, the enamel has been thoroughly baked. Ovens of the oven must be such that by the time the work reaches the exit, the enamel has been thoroughly baked. Ovens of this character requires the doors open continuously. In order to prevent heat losses through these openings and to keep the smoke and vapors from filling the enameling room, the oven must be constructed so as to obtain an air seal around the opening or an exhaust fan used at the proper point of the oven to secure an air balance, and at the same time provide ample ventilation.

The efficiency of the above types of ovens, which are manufactured by the Westinghouse Electric & Mfg. Company, at East Pittsburgh, Pa., expressed in pounds of work or finished products, per KW hour consumption for ovens of the latest of each of the respective types, having the highest grade insulation, proper ventilation and intelligent operation of the oven, is herewith given:



ENAMELING OVEN, WITH HEATERS ALONG WALL AND IN CENTER OF OVEN.

Kiln-type oven, Hand-operated: 6 to 8 pounds of work per kilowatt hour.

Kiln-type oven, Truck-operated: 10 to 12 pounds of work per kilowatt hour.

Semi-continuous Conveyor-type oven: 10 to 12 pounds of work per kilowatt hour.

Continuous Conveyor-type oven: 25 to 30 pounds of work per kilowatt hour.

CRYSTALAC—A NEW LACQUER

There has recently been placed on the market by the Du-Pont Chemical Works, New York, a novel lacquer product. It is intended for general use over metal, producing a fine crystalline effect.

Heretofore, crystalline effects have been produced by sanding with a glistening white sand on newly painted surfaces or by mixing sand or crystals with the paint or lacquer before applying. Sanding covered the color and rubbed or weathered off. Mixing sand with lacquer was unsatisfactory because the sand sank to the bottom of the pail and would not remain in suspension until applied, hence an uneven, ununiform application.

As crystalac contains no sand, it may be uniformly applied. It is no more likely to rub or weather off than any other lacquer; the color is not affected or dimmed by the process that causes the crystalline effect.

Crystalac produces new and beautiful effects. Its use creates a rough finish on any enameled or laquered surface. It is applied either by spraying or dipping. A heavy coat of the material produces coarse crystals; a light coat, fine crystals. The finish develops after standing about eight hours; it is fully developed at the end of twenty-four hours. The number of articles upon which the new finish may be applied are virtually unlimited.

WALLACE BENCH SAW

By H. L. Ramsey

One of the latest machines on the market is the Wallace Bench Saw shown in the accompanying illustration. This machine makes possible the application of an idea which is sure to increase the output and greatly reduce the cost of pattern, cabinet or carpenter work and in fact any woodwork for it is possible to do the work at the bench, thus saving a great amount of time which must now be wasted running to and from stationary machines and at the same time doing this work on a machine.

As the name implies, the Wallace Bench Saw is a bench tool, portable and designed to operate on the electric lighting circuit, yet it has ample power to take a full 2 inch cut through the hardest of wood, making it possible to use this machine for 80 per cent, if not all, of the work generally done by hand or on the big circular saw in a pattern, cabinet, jobbing and contracting carpenter shop or woodworking plant.

THE WALLACE BENCH SAW.

Several new features are incorporated in the designing of the Wallace Bench Saw which are certain to be time savers.

For instance, this machine overcomes the decided disadvantages of the usual design. To cut at an angle the saw is tilted on the Wallace Bench Saw instead of cocking up a heavy table. The illustration shows the saw tilted to a 45 degree angle. This, as will be readily realized, makes it possible to cut long stock without fear of breaking the angle by the stock coming in contact with the floor, as is the case so often experienced when attempting to cut long stock on a table tilting machine. Other advantages accruing from this saw tilting design are, first: the operator is working on a table which is always in a horizontal, efficient and safe position; second: the exact angle of cut is set without much difficulty by simply spinning the hand wheel until the angle desired is registered on the dial in the front of the machine; third: no time is wasted adjusting the machine, for, as is often the experience when attempting to set a table tliting machine, the heavy table drops a few degrees before the screw is tightened, making it necessary to do the work over again or if the drop goes unnoticed the cut is taken and the stock either spoiled or the job must be done over.

The Wallace Bench Saw is the first of its type put on the market and had its first showing at the Milwaukee Convention of the American Foundrymen's Association in October, 1918, by the makers, J. D. Wallace & Company, of Chicago, Ill.

INDICATING CALIPERS

The caliper shown in the cut is said by the manufacturers to be a tool which is accurate and of the simplest construction for instant and easy service.

It is operated very easily. The handle held in the lower part of the palm, and the thumb or index finger on the trigger, the calipers can be opened with the slightest pressure to any desired width.

The measurement is shown on a scale arranged in form like a planemeter and can be read instantly, without the use of anything other than the scale itself. The Indicating

THE INDICATING CALIPERS.

Calipers are made in two sizes, one to open to a measurement of two inches, and the other opening to three inches.

Two scales are used, one divided in sixty-fourths of an inch and the other in hundredths of an inch. The two inch caliper is in hundredths of an inch and the three inch, in sixty-fourths.

For easy reading the hundredths of an inch are divided in tens, each ten being given a figure, 10, 20, 30, etc. The sixty-fourths are divided in eighths. Each eighth being marked 1, 2, 3, 4, etc.

An added advantage is that the indicator shows these fine measurements on such an increased scale that a variation of a half a hundredth is readily observed, while on the 3 inch caliper a variation of half a sixty-fourth is readily seen. In fact it is a 3 in 1 proposition consisting of an outside caliper, a rule and magnifying glass.

Details of Construction.

The indicating hand is moved by means of the geared segment and pinion. A spring coiled in the barrel over the pinion actuates the pinion and the hand attached to it, and draws the caliper together. The constant pressure from one side eliminated any possible back-lash.

The sector with the geared segment is set on ball bearings, insuring smooth, easy action.

The indicating hand is fastened at two points—the lower part over the pinion and a little further up on the pinion. The latter hole is elongated, permitting compensation for any wear of the gear teeth. Adjustment can be made in a few minutes.

The lower leg of the caliper is attached to the geared segment by a screw and two pins. Various shaped legs may be attached for specal use. The points are glass hand and will stand much wear.

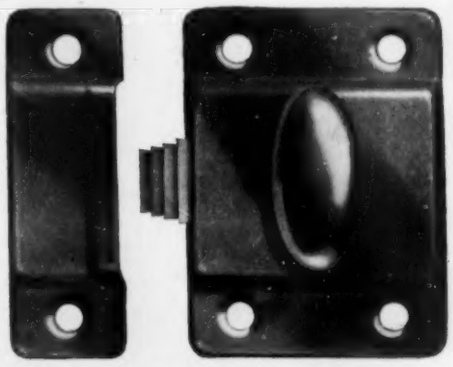
Screw Locking Device.

At the bottom of the geared sector is a spur. A little below is a round nut driving a screw. Calipers may be set at any measure by driving the screw forward to bear upon the spur. The indicating caliper is made by the Indicating Caliper Company, 508 East 10th Street, New York.

IMPROVED CUPBOARD CATCH

The Moss-Ochs Company, of Cleveland, Ohio, have recently placed on the market a new and improved Cupboard Catch and Turn and Window and Transom Catch.

The plunger of each, as you will note from the accompanying photo, is made with steps, instead of being straight.



IMPROVED CUPBOARD, WINDOW OR TRANSOM CATCH.

The object of this is, that most always the door or window or wnerever the catch is placed warps, but with this step-like plunger the catch is always sure to catch.

With this new latch, if the door or window does not warp, the plunger will catch in the first step. Should the door warp a little, the plunger will catch in the second step and so on, allowing the door to warp almost a half inch and at the same time assuring that the catch will catch.

COPPER ONE-PIECE CHAPLET

Heretofore, the only double head chaplet that has been procurable for brass castings has been the plates fitted style, with round or square heads, made of copper.

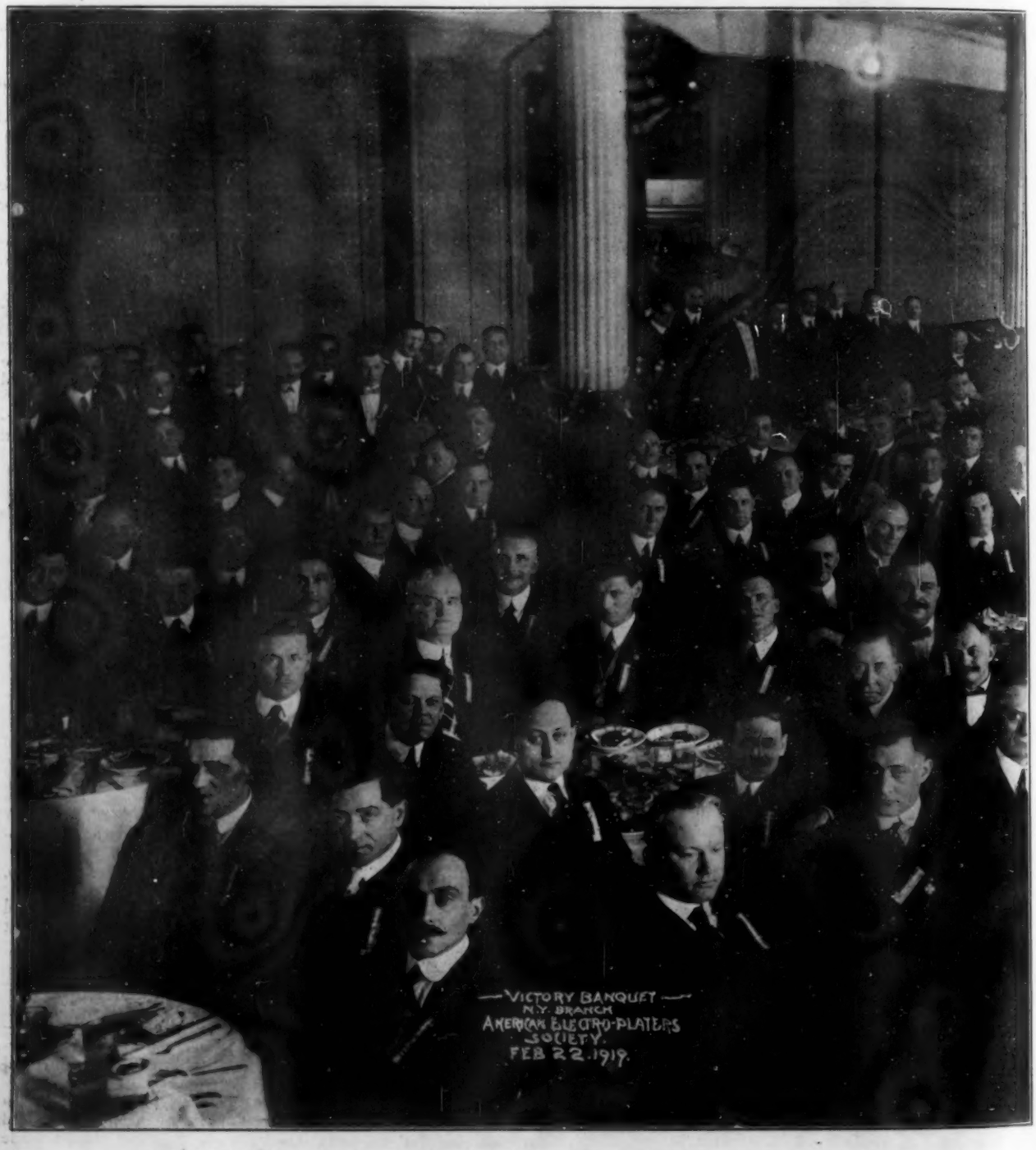
The success the J. W. Paxson Company, Philadelphia, Pa., is having with its one-piece chaplet, made of steel, has induced them to offer the brass foundry trade the same chaplet made of copper.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

VICTORY BANQUET OF THE NEW YORK BRANCH OF THE AMERICAN ELECTRO-PLATERS' SOCIETY

Perhaps the most successful banquet that the New York Branch has ever had was their Tenth Annual, held on Saturday evening, February 22, 1919, at the Broadway Central Hotel. From early afternoon until the call to dinner was announced at 8 o'clock the second floor of the hotel was thronged with visiting platers and their friends. Judging from snatches of conversation overheard by a casual passer-by, there is as yet no let up in the demand for plating and finishing of metals and platers



THE TENTH ANNUAL BANQUET OF THE NEW YORK BRANCH OF THE AMERICAN ELECTRO-

from all manner of concerns, both large and small, jobbing and specialty shops, all seemed to have the same story to tell and that was that they were extremely busy.

The banquet itself was an enjoyable affair for as the title indicates it was a victory banquet and consequently good cheer was observed at every table. An efficient pair of musical entertainers kept the platers in good humor until the time for speech-making arrived. As a departure from the usual custom there was only one speaker at the Victory Banquet and he, Dr. M. C. Burt, head of the Research Department of the Atlas Powder Company, made an interesting and patriotic address on "Reconstruction." Dr. Burt told his hearers of the part played in the late war by the United States in the production of chemicals necessary for the manufacture of munitions, gas products and sanitary operations. He outlined briefly what he considered was the future of the United States in the manufacture of such chemicals as had formerly been obtained from abroad. Among such materials that he enumerated were dye-stuffs, metallic cyanides, nitrate of soda, nitric acid, alcohol and various other chemicals which the United States has discovered how to produce. He predicted that in a very short time this country would be absolutely independent of any other in chemicals of any sort.

Committees

The committees which were responsible for the arrangements and execution of the Victory Banquet were as follows: Banquet

PLATERS' SOCIETY, HELD AT BROADWAY CENTRAL HOTEL, FEBRUARY 22, 1919.

Committee—W. J. Schneider, chairman, to whom great credit for the success of the banquet is due; John E. Sterling, William Fischer, S. Schubert, Joseph Minges, Thomas B. Haddow, William Voss, William Betz and A. D. Havens. Reception Committee—H. C. Flanigan, L. M. Graham, O. C. Moller, F. J. Clark, C. H. Buchanan, B. Popper, H. Maynard and H. H. Reama.

The program of the banquet distributed by the New York branch was a very creditable production, being a little booklet of sixty odd pages which contained in addition to the menu discussed, a list of the members of the New York branch, some useful tables for platers regarding weights and measures and advertisements from various firms in the plating supply business. Among the souvenirs distributed at the banquet were, from Apothecaries Hall Company, New Haven, Conn., note books; Egyptian Lacquer Company, New York, note books and blotters; J. B. Ford Company, Wyandotte, Mich., scarf pins and Celluloid Zapon Company, New York perpetual calendar.

The officers of the New York branch are: Thomas B. Haddow, president; John E. Sterling, vice-president; William Fischer, secretary and treasurer and A. Flomm, recording secretary.

MEMBERS AND GUESTS WHO ATTENDED THE BANQUET

The complete list of those who attended the banquet is as follows:

1—John Burke, 110 Glen street, Brooklyn, N. Y.; Robert Findlay Mfg. Co., Brooklyn, N. Y.

2—L. J. Krom, Plainfield, N. J.; THE METAL INDUSTRY, 99 John street, N. Y. City.

3—G. W. Cooper, Jersey City, N. J.; THE METAL INDUSTRY, 99 John street, New York City.

4—H. C. Burr, New York City; THE METAL INDUSTRY, 99 John street, New York City.

5—George J. Weigand, 290 Vermont avenue, Providence, R. I.; Rau Mfg. Co., Providence, R. I.

6—J. G. Kopp, 199 Alden street, Orange, N. J.; Edison Phonograph Works, Orange, N. J.

7—I. Schoonmaker, 152 W. 98th street, New York City; M. Cohen & Co., 212 W. 26th street, New York City.

8—A. Havens, Richmond Hill, L. I.; E. G. Webster & Son, Brooklyn, N. Y.

9—W. Betz, 3903 Beaufort avenue, Brooklyn, N. Y.; E. W. Bliss & Co., Brooklyn, N. Y.

10—R. Massicotte, 476 W. 22d street, N. Y. City; Bronze Products Society, 53 Hope street, Brooklyn, N. Y.

11—R. Warner, Binghamton, N. Y.; Crandall Stone Co., Binghamton, N. Y.

12—H. Reama, 1516 Mt. Royal avenue, Baltimore, Md.; Oakley Chemical Co., New York City.

13—Chas. Kopp, 52 Columbia street, W. Orange, N. J.; Thomas Edison, Co., Orange, N. J.

14—Martin J. Smith, 417 N. 6th street, Philadelphia; Budd Mfg. Co., Philadelphia, Pa.

15—B. Popper, 152 Front street, N. Y. City; Egyptian Lacquer Co., N. Y. City.

16—G. B. Hogaboom, 576 Stanley street, New Britain, Conn.; Scoville Mfg. Co., Waterbury, Conn.

17—J. M. Dunn, 487 Wilmot street, Bridgeport, Conn.; International Silver Co., Factory C, Bridgeport, Conn.

18—C. H. Dunn, 9 Prospect avenue, Sag Harbor, N. Y.; Alvins Mfg. Co., Sag Harbor, N. Y.

19—Philip Uhl, 2432 N. 29th street, Philadelphia, Pa.; R. M. Green Sons Co., Philadelphia, Pa.

20—H. B. Tarrand, Sellersville, Pa.; United States Gong Co., Sellersville, Pa.

21—P. A. Willard, 33 Liberty street, Bridgeport, Conn.; Burns & Bassick Co., Bridgeport, Conn.

22—J. L. Dinan, 131 N. Dewey street, Philadelphia, Pa.; Celluloid Zapon Co., N. Y. City.

23—G. Schweinsberg, 288 Rycrson street, Brooklyn, N. Y.; U. S. Galvanizing Co., 32 Stockton street, Brooklyn, N. Y.

24—W. Stratton, 153 Elm street, Bridgeport, Conn.; Robert N. Bassett Co., Shelton, Conn.

25—Dick Sliter, 8809 Hough avenue, Cleveland, Ohio; Celluloid Zapon Co., N. Y. City.

26—W. J. Schneider, 899 City Hall Station, N. Y. City; Roessler & Hasslacher Chemical Co., N. Y. City.

27—R. B. Condit, 715 Wethersfield avenue, Hartford, Conn.; J. B. Ford Co., Wyandotte, Mich.

28—W. Fisher, 300 St. Anns avenue, N. Y. City; General Optical Co., Mt. Vernon, N. Y.

29—R. H. Bourdon, 175 Church street, New Haven, Conn.; Celluloid Zapon Co., New Haven, Conn.

30—John Oberender, 185 Church street, New Haven, Conn.; Celluloid Zapon Co., New Haven, Conn.

31—A. Grant, 45 Grafton street, Boston, Mass.; J. B. Ford Co., Wyandotte, Mich.

32—J. H. Bissland, Nodica street, Springfield, Mass.; Hendee Motor Cycle Co., Springfield, Mass.

33—E. M. Stevenson, Hartford, Conn.; Celluloid Zapon Co., New Haven, Conn.

34—G. E. Hopkinson, Bridgeport, Conn.; Remington Arms Co., Bridgeport, Conn.

35—F. C. Mesie, Sherrill, N. Y.; Oneida Community Co., Oneida, N. Y.

36—P. Morningstar, 433 125th street, Richmond Hill, L. I.; Jones Speedometer Co., New Rochelle, N. Y.

37—J. Brosner, 107 N. Whitney avenue, Wallingford, Conn.; Wallingford Company, Wallingford, Conn.

38—J. Blanchard, 115 Church street, Wallingford, Conn.; R. Wallace & Sons, Wallingford, Conn.

39—I. L. Merigold, Irvington, N. J.; Merigold Plating Co., Newark, N. J.

40—S. Herrick, Box 43, Watertown, Mass.; Celluloid Zapon Co., New Haven, Conn.

41—N. Dabolt, 190 Willard street, New Haven, Conn.; Celluloid Zapon Co., New Haven, Conn.

42—H. Keppler, 1258 Broadway, Brooklyn, N. Y.; Caldwell Co., 15th street, New York City.

43—O. I. Sizelove, 959 Chancellor avenue, Irvington, N. J.; Merigold Plating Co., Newark, N. J.

44—O. C. Moller, River Edge, N. J.; J. B. Ford Co., Wyandotte, Mich.

45—C. DeBaun, 152 Front street, New York City; Egyptian Lacquer Co., New York City.

46—Wm. Voss, 425 125th street, Richmond Hill, L. I.; Brass Goods Mfg. Co., 345 Eldert street, Brooklyn, N. Y.

47—J. H. Straub, 412 E. 159th street, New York City; R. H. Macy Co., New York City.

48—H. Fales, Supt., 2121 Foster avenue., Brooklyn, N. Y.; R. H. Macy Co., New York City.

49—G. Potthoff, 52 Broadway, New York City; Nat. Galv. Plating Equip. Co., New York City.

50—K. Potthoff, 52 Broadway, New York City; Nat. Galv. Plating Equipt. Co., New York City.

51—J. Sterling, 414 Vandeventer avenue, Long Island City; Defiance Button Machine Co., Long Island City.

52—J. W. Slattery, 287 Cortland avenue, Bridgeport, Conn.; Cornwall & Patterson, Bridgeport, Conn.

53—T. F. Slattery, New Britain, Conn.; P. & F. Corbin Co., New Britain, Conn.

54—J. H. Stremel, 459 43d street, Brooklyn, N. Y.; Chas. Schaefer, 47 Ann street, New York City.

55—Royal F. Clark, 3 Winfield street, South Norwalk, Conn.; Acme Shear Co., Bridgeport, Conn.

56—Tom Brown, 147 Eldert street, Brooklyn, N. Y.; Celluloid Zapon Co., New York City.

57—H. Maynard, 728 Jefferson avenue, Brooklyn, N. Y.; Celluloid Zapon Co., New York City.

58—Philip Sievering, 54 Nairn place, Newark, N. J.; Philip Sievering, New York City.

59—T. B. Hoyt, Jr., P. O. Box 391, Bristol, Conn.; C. J. Root Mfg. Co., Bristol, Conn.

60—Nelson Barnard, Great Barrington, Mass.; Stanley Insulating Co., Great Barrington, Mass.

61—C. Schlott, 152 Front street, New York City; Egyptian Lacquer Co., New York City.

62—W. E. Symonds, 26 Chester street, Lowell, Mass.; Lamson Co., Lowell, Mass.

63—Horace Smith, 11 Terrace place, Belleville, N. J.; Tiffany Co., Newark, N. J.

64—J. Baldassaro, 181 Worth street, New York City; Hanson & Van Winkle Co., Newark, N. J.

65—L. Baldassaro, 14 Cherry street, New York City; Hanson & Van Winkle Co., Newark, N. J.

66—I. Berger, 44 Tompkins avenue, Brooklyn, N. Y.; Brust Bros., Brooklyn, N. Y.

67—H. Bernard, 115 Roslyn street, Rochester, N. Y.; Oakley Chemical Co., N. Y. City.

68—A. J. MacDermid, Waterbury, Conn.; Apothecaries Hall Co., Waterbury, Conn.

69—N. Dice, Waterbury, Conn.; Apothecaries Hall Co., Waterbury, Conn.

70—F. Duffy, 279 Devoe street, Brooklyn, N. Y.; American Everready Works, Long Island City, N. Y.

71—L. H. O'Donnell, 37 Seaview avenue, Jersey City, N. J.; W. M. Crane Co., Jersey City, N. J.

72—T. Haddow, 11 Howell place, Newark, N. J.; A. Goertz Co., Newark, N. J.

73—O. F. Carlson, 225 West Grand st., Rahway, N. J.; Regina Company, Rahway, N. J.

74—J. W. DeMars, 497 12th avenue, Newark, N. J.; Monroe Calculating Machine Co., Orange, N. J.

75—H. Gleichman, 10 Tremont avenue, Newark, N. J.; Richard Best Co., Irvington, N. J.

76—John Loeffler, 310 Smith street, West Hoboken, N. J.; Safety Car Heating & Lighting Co., Jersey City, N. J.

77—F. Hauschatter, 1450 Lambert street, Richmond Hill, L. I.; Sperry Gyroscope Co., Brooklyn, N. Y.

78—George E. Irvin, 135 Walnut street, Reading, Pa.; Reading Hardware Co., Reading, Pa.

79—Geo. E. Tyson, Reading, Pa.; Reading Hardware Co., Reading, Pa.

80—A. Talamona, 76 Yorkton street, West Somerville, Mass.; M. W. Carr Co., West Somerville, Mass.

81—B. Cross, 256 Denson avenue, Brooklyn, N. Y.; Mutual Lamp Co., 21 E. Houston street, N. Y. City.

82—E. Millwater, Dry Harbor road, Glendale, L. I., N. Y.; Greenpoint Metallic Bed Co., Brooklyn, N. Y.

83—B. Stone, 404 Bloomfield avenue, Bloomfield, N. J.; Consolidated Safety Pin Co., Bloomfield, N. J.

84—H. M. Johnquest, 23 Kingsbury street, Waterbury, Conn.; Chase Metals Co., Waterbury, Conn.

85—F. J. Clark, Springfield, Mass.; A. P. Munning Company, New York City.

86—J. B. Fay, Philadelphia, Pa.; A. P. Munning Company, New York City.

87—H. A. Guertin, Worcester, Mass.; A. A. Brunnell Company, Worcester, Mass.

88—S. Schurbert, 77 India street, Brooklyn, N. Y.; S. & B. Company, Brooklyn, N. Y.

89—G. Gehling, 5001 Edmund street, Philadelphia, Pa.; Penn Rivet Corp., Philadelphia, Pa.

90—J. Griffin, 46 Alexander street, Newark, N. J.; Bassick Co., Newark, N. J.

91—C. G. Backus, New York City; A. P. Munning & Co., New York City.

92—Ed Smalenberger, 146 E. 14th street, Brooklyn, N. Y., Bachmeier Co., New York, N. Y.

93—Elmer Smalenberger, 636 E. 34th street, Brooklyn, N. Y.; Newport Chemical Co., Passaic, N. J.

94—C. Laut, 127 Lafayette street, Glendale, L. I.; Dill, Crossett Company, New York City.

95—W. Shay, 22 Dry Harbor road, Glendale, L. I.; Brooklyn Union Gas Company, Brooklyn, L. I.

96—W. J. MacDonald, 66 Durham street, Attleboro, Mass.; Finberg Mfg. Co., Attleboro, Mass.

97—A. J. Lemrise, 124 Waverly street, Providence, R. I.; Markham & Stone, Providence, R. I.

98—Thomas Stretch, 382 Monroe street, Brooklyn, N. Y.; Edward & Co., New York City.

99—J. G. Godfrey, 140 Foxall street, Brooklyn, N. Y.; Shapiro & Aronson, Brooklyn, N. Y.
100—D. Baumann, 550 Springfield street, Newark, N. J.; Western Electric Company, Newark, N. J.
101—H. Flanigan, New York City; Maas & Waldstein Co., New York City.
102—H. W. McGovern, 200 Fifth avenue, New York City; Celluloid Zapon Co., New York City.
103—M. I. Doyle, Brooklyn, N. Y.; U. S. Electrogalvanizing Co., Brooklyn, N. Y.
104—E. Cohen, 51 Maiden Lane, New York City; Cohen-Epner, 51 Maiden Lane, New York City.
105—G. H. Niemeyer, 59 Cedar street, New York City; Handy & Harman, 59 Cedar street, New York City.
106—Wm. Bechtold, 59 Cedar street, New York City; Handy & Harman, 59 Cedar street, New York City.
107—F. E. Bennett, Harrison, N. J.; Bloomfield Chemical Co., Harrison, N. J.
108—Jos. Reuter, 96 Starr street, Brooklyn, N. Y.; Mt. Vernon Silversmith Co., Mt. Vernon, N. Y.
109—E. Schor, 660 Dawson street, New York City; Gorham Mfg. Co., New York City.
110—Samuel Jacobs, 1377 40th street, Brooklyn, N. Y; Shapiro & Aronson, Brooklyn, N. Y.
111—E. T. Homan, 438 S. 5th street, Camden, N. J.; Welsbach Co., Gloucester, N. J.
112—M. E. Stevenson, Bridgeport, Conn.; American Chain Company, Bridgeport, Conn.
113—Steve Masek, Bridgeport, Conn.; American Chain Co., Bridgeport, Connn.
114—Wm. Keith, 222 Locust avenue, Port Chester, N. Y.; Robert Birdsall & Co., Port Chester, N. Y.
115—W. Taylor, 49 Exchange place, Port Chester, N. Y.; Universal Stamping Machine Co., Stamford, Conn.
116—J. A. Messick, Waterbury, Conn.; American Brass Company, Waterbury, Conn.
117—W. Matts, 169 Peshine avenue, Jersey City, N. J.; J. E. Mergott Co., Newark, N. J.
118—Chas. Vollmer, 268 Ogden avenue, Jersey City, N. J.; E. J. Caldwell Co., New York City.
119—J. Hanson, 383 Kent avenue, Brooklyn, N. Y.; Sterling Casket Hardware Co., Brooklyn, N. Y.
120—H. M. Amrein, 77 Broadway, Brooklyn, N. Y.; G. J. Nikolas Co., Chicago, Ill.
121—N. F. Nonamker, 77 Broadway, Brooklyn, N. Y.; G. J. Nikolas Co., Chicago, Ill.
122—G. J. Tyndall, 28 Robert street, Attleboro, Mass.; Geo. L. Claflin Co., Providence, R. I.
123—M. Stewart, 45 Woodruff place, Perth Amboy, N. J.; Roessler & Hasslacher Chemical Co., New York City.
124—L. J. Perkins, 186 Washington avenue, Providence, R. I.; R. E. Sturdy Co., Providence, R. I.
125—L. M. Graham, Irvington, N. J.; Connecticut Dynamo & Motor Co., Irvington, N. J.
126—C. Frey, Newark, N. J.; Maas & Waldstein, New York City.
127—T. A. Trumbour, Butler, N. J.; THE METAL INDUSTRY, New York City.
128—A. Grindon, New Rochelle, N. Y.; Johns-Manville Co., New Rochelle, N. Y.
129—C. H. Redding, New York City; *Brass World Co.*, Elm and Duane streets, New York City.
130—A. J. Dulie, 138 S. 9th street, Newark, N. J.; Westinghouse Electric Co., Newark, N. J.
131—H. Green, 19 Brunnell street, Providence, R. I.; Thomas McGrath, Providence, R. I.
132—W. Berg, 119 Lincoln avenue, Brooklyn, N. Y.; E. B. Meyrowitz, 149 W. 46th street, New York City.
133—H. L. Haas, 489 Broome street, New York City; General Platers' Supply Co., New York City.
134—W. H. Bent, 807 Union street, Brooklyn, N. Y.; P. E. Guerin Co., 23 Jane street, New York City.
135—J. Carruba, 254 W. 146th street, New York City; Habech & Weiss Co., 124 Baxter street, New York City.
136—H. L. Dewey, 79 Woodruff avenue, Brooklyn, N. Y.; G. J. Nikolas Co., Brooklyn, N. Y.
137—Ed. McGuik, 663 46th street, Brooklyn, N. Y.; Tagliabue Mfg. Co., Brooklyn, N. Y.
138—W. P. Miller, 5121 6th avenue, Brooklyn, N. Y.; Tagliabue Mfg. Co., Brooklyn, N. Y.
139—S. Boas, 1188 Park avenue, New York City; Mutual Lamp Co., 20 E. Houston street, New York City.
140—A. R. Polmatier, 119 Hooper street, Brooklyn, N. Y.; Sterling Casket Hardware Co., Brooklyn, N. Y.
141—G. M. Barnes, 248 N. 7th street, Newark, N. J.; Oakley Chemical Co., 22 Thames street, New York City.
142—A. P. Hinton, 23 Wakeman avenue, Newark, N. J.; Oakley Chemical Company, New York City.
143—T. H. Gritmon, 468 55th street, Brooklyn, N. Y.; Oakley Chemical Company, New York City.
144—A. A. Brunnell, Worcester, Mass.; A. A. Brunnell Co., Worcester, Mass.
145—A. G. Brunnell, Worcester, Mass.; A. A. Brunnell Co., Worcester, Mass.
146—H. Clement, Mt. Vernon, N. Y.; General Optical Company, Mt. Vernon, N. Y.
147—H. Miller, 65 S. 9th street, Brooklyn, N. Y.; Sterling Casket Hardware Co., Brooklyn, N. Y.
148—J. Brust, 393 Benedict avenue, Woodhaven, L. I.; Brust Bros., Brooklyn, N. Y.
149—Geo. Begam, Springfield, Mass.; J. R. Lyman Co., Springfield, Mass.
150—S. Groves, Island avenue, Stamford, Conn.; Celluloid Zapon Co., New York City.
151—Ed. Lawrence, 179 Eckford street, Brooklyn, N. Y.; Tuttle & Bailey Co., Brooklyn, N. Y.
152—M. Lawrence, 16 N. Henry street, Brooklyn, N. Y.; Tuttle & Bailey Co., Brooklyn, N. Y.
153—T. J. Noonan, 248 10th street, Brooklyn, N. Y.; W. G. Creamer & Co., Brooklyn, N. Y.
154—E. L. Baptiste, Wilmington, Del.; Atlas Powder Co., Wilmington, Del.
155—F. E. Amthor, 1729 W. 11th street, Brooklyn, N. Y.
156—H. Simon, 225 Hewes street, Brooklyn, N. Y.; B. Rice & Sons, Brooklyn, N. Y.
157—J. E. Meter, 68 Vanreipen avenue, Jersey City, N. J.; Roessler & Hasslacher Chemical Co., New York City.
158—H. Bolde, 1929 Harman street, Brooklyn, N. Y.; E. B. Meyrowitz, New York City.
159—Ed Wester, 191 N. 9th street, Newark, N. J.; A. Goertz & Co., Newark, N. J.
160—H. S. Wyckoff, 100 William street, New York City; Harshaw, Fuller & Goodwin Co., New York City.
161—A. W. Keller, 200 5th avenue, New York City; Celluloid Zapon Co., New York City.
162—O. W. Mott, 2039 N. 21st street, Philadelphia, Pa.; J. E. Caldwell & Co., Philadelphia, Pa.
163—J. P. Orben, Newark, N. J.; Hanson & Van Winkle Co., Newark, N. J.
164—W. J. Bell, 707 N. 35th street, Philadelphia, Pa.; Orbis Products Trading Co., Inc., Philadelphia, Pa.
165—Leo Bode, 100 William street, New York City; Roessler & Hasslacher Chemical Co., New York City.
166—J. J. Fannon, Jr., 1517 8th avenue, Brooklyn, N. Y.; Moller Art Plating Co., New York City.
167—F. Kottman, 211 Skillman street, Brooklyn, N. Y.; Bommer Spring Hinge Co., Brooklyn, N. Y.
168—Alfred Matten, 597 5th avenue, Astoria, L. I.; John Hassall Co., Brooklyn, N. Y.
169—C. Lombardo, 341 Melrose street, Brooklyn, N. Y.; A. Ludwig Co., Brooklyn, N. Y.
170—E. Gillen, 1724 Gates avenue, Brooklyn, N. Y.; Hudson Brass Works, Brooklyn, N. Y.
171—E. N. Bentine, Avenue D, College Point, L. I.; Caldwell Company, New York City.
172—F. Gumm, 205 1st street, Hoboken, N. J.; Oxweld Acetylene Company, Newark, N. J.
173—J. Tixione, 1315 42d street, Brooklyn, N. Y.; Aero Battery Co., 1377 40th street, Brooklyn, N. Y.
174—G. Coller, 433 S. 9th street, Reading, Pa.; Adams Mfg. Co., Reading, Pa.
175—W. M. Garbe, 22 Thomas street, New York City; Oakley Chemical Co., New York City.
176—R. W. Pope, 1011 Chestnut street, Philadelphia, Pa.; McIntyre Co., Philadelphia, Pa.
177—J. E. Stelker, 900 E. Shelton avenue, Philadelphia, Pa.; Blaisdell Pencil Co., Philadelphia, Pa.
178—E. Haas, 504 E. 163d street, New York City; Stanley & Patterson Co., New York City.
179—W. H. Ashoff, Waterbury, Conn.; American Ring Co., Waterbury, Conn.
180—Dr. M. C. Burt, Tomaqua, Pa.; Atlas Powder Company, Wilmington, Del.
181—Chas. Menaza, New York City; E. J. Bass Company, New York City.
182—R. M. Quinn, 244 Reid avenue, Brooklyn, N. Y.; National Bending Machine Co., Brooklyn, N. Y.
183—S. H. Hanson, 84 73d street Brooklyn, N. Y.; U. S. Electro Galvanizing Co., Brooklyn, N. Y.
184—F. H. Richmond, 135 W. 63d street, New York City.
195—Lesch & Farrel, 225 Centre street, New York City.
186—A. Pflomm, 763 Summer avenue, Newark, N. J.

Detroit Branch—Meets first Friday of each month at Cass Technical High School, High and Grand River. Secretary, C. S. Tompkins, 595 Seventeenth street, Detroit, Mich.

DETROIT BRANCH BANQUET

The Detroit Branch of the American Electric Platers Society is doing everything possible to make its meetings and social gatherings interesting and snappy. They have started in the new year well as was evidenced Saturday evening, February 15, when the Branch held its annual banquet and listened to addresses from experts in the field of electro plating.

There was no war-time restrictions and what was served made the event the happiest of any this organization has ever held. The arrangements were in charge of C. S. Tompkins of the J. B. Ford Company, and when he sets out to do a thing you may rest assured it is always done right.

E. G. Lovering was toastmaster and presided with the the grace and good cheer which has made him so popular among the platers throughout the country. Charles Cequin—everybody in the Detroit branch knows him—in a snappy address showed how the educational institutions are co-operating with the electro plating organizations in an endeavor to advance the interests of the industry.

H. S. Brockway, who also is as well known as Mr. Cequin, discussed the great advancement made in the plating industry within the last five years, showing that in this period more had been accomplished than in the previous twenty years.

Professor Phillips of the Cass Technical High School, who is conducting a class in electro plating in that institution, spoke enthusiastically of what had been accomplished during the last winter. He was followed by Professor Ferguson of the University of Michigan, who showed how colleges and other higher educational institutions throughout the country, are also co-operating with the American platers in a way that means still further advancement in the plating industry. James Schermerhorn, editor of the Detroit *Times*, entertained the platers in a humorous way and made references to interesting topics of the day.

This gathering certainly showed the real spirit of the Detroit Branch of the American Electro Platers' Society. Every member is loyal and enthusiastic in his efforts to make still further advances in the plating industry.—F. J. H.

Newark Branch—Meets first and fifth Fridays of each month at the Foresters Home, 20 Central avenue, Newark, N. J. Secretary, O. F. Carlson, 225 West Grand street, Rahway, N. J.

The Newark Branch will give a banquet Saturday evening, March 15, at Acktel-Stetters, Broad street, Newark, and all platers and friends, including ladies, are invited to attend. Speaking, singing, music and dancing will be provided. Tickets for the banquet are $2.50, and may be obtained from members of the committee or the secretary. As this will be the first banquet to be held by the Newark Branch, the committee, which consists of Horace Smith, John Merigold and O. F. Carlson, is working very energetically to make it a big success.

Providence Branch—Meets first and Third Thursday of each month at 26 Custom House street, Room 16. Secretary, Albert J. Lemrise, 124 Waverly street, Providence, R. I.

The Providence Branch at its recent meeting had as the subject for discussion, "Zinc Solution," which brought out some very interesting points and data, including the reading of the government formula for this solution. The local branch is constantly growing in membership and importance, and its efforts to put electroplating on a more scientific basis is bearing excellent results and proving of benefit to a number of industries.

Indianapolis Branch—Meets second Saturday of each month at the Dennison Hotel. Secretary, Louis Mertz, 1725 Union street, Indianapolis, Ind.

The subject for discussion at the regular meeting held February 8 was the construction, maintenance and cost of operating nickel solutions. The visitors of the evening were Charles Howard, of Anderson, Ind., and Mr. Werft, of the Celluloid Zapon Company. The subject for the March meeting will be Copper Plating.

St. Louis Branch—Meets third Saturday of each month at the Central Public Library. Secretary, H. H. Williams, 4156 Botanical avenue, St. Louis, Mo.

As THE METAL INDUSTRY goes to press, the sixth annual banquet of the St. Louis Branch is being held at the American Annex, St. Louis, Mo. A program that is devoted principally to educational features has been prepared and a discussion in which the ideas of every member in regard to pickling is to be presented.

Philadelphia Branch—Meets first Friday of each month in the Harrison Laboratory building, University of Pennsylvania. Secretary, Philip Uhl, 2432 North 29th street, Philadelphia, Pa.

Secretary Uhl announced that at the regular meeting held February 7 it was decided that the headquarters for the annual convention to be held in Philadelphia, July 1, 2 and 3, would be at the Hotel Bellevue-Stratford.

Cleveland Branch—Meets second and last Friday of the month at 1344 Prospect avenue, Room 6.

W. D. Scott, 3479 West 90th street, Cleveland, Ohio, has been appointed secretary to take the place of J. B. Heargeist, 5617 Utica avenue, Cleveland, Ohio.

METROPOLITAN BRASS FOUNDERS' ASSOCIATION

The name of the brass founders' association which, as mentioned in the February issue of THE METAL INDUSTRY, was recently organized is the Metropolitan Brass Founders' Association and W. E. Paulson, secretary, 97 Second avenue, Brooklyn, N. Y., states that the association has been formed to further the mutual interests of the foundry trades in the Metropolitan district.

The members of the association are as follows: Walker M. Levett & Company, Walker M. Levett, 415 East 23rd street, New York; E. F. Caldwell & Company, Mr. Von Loseberg, 50 Church street; J. B. McCoy & Son, R. D. McCloskey, 114 West 30th street; Thomas Paulson & Son, Inc., William E. Paulson, 97 Second avenue, Brooklyn, N. Y.; R. Hamilton & Son, Inc., J. W. Hamilton, 56 Water street, Brooklyn, N. Y.; E. A. Williams & Son, Inc., Thomas Williams, 105 Plymouth street, Jersey City, N. J.; George Krouse, 148 Morgan street, Jersey City, N. J.; James Gallagher's Sons, James W. Gallagher, 87 Centre street, New York; Sterling Bronze Company, L. Roth, 16 East 40th street, New York; Penn Brass & Bronze Works, F. H. Landolt, 111 Dobbins street, Brooklyn, N. Y.; Tiffany Studios, Joseph Armstrong, Corona, L. I., N. Y.; W. G. Creamer & Company, William Creamer, Smith & Creamer street, Brooklyn, N. Y.; Magnus Metal Company, C. A. Coogan, Jersey City, N. J.; New York Brass Foundry, Joseph Bechtold, 104 Centre street, New York; John J. Tighe, 150 25th street, Brooklyn, N. Y.; Janusch Manufacturing Company, 496 East 134th street, New York; Thomas Harper, 204 Lafayette street, New York; George Staats & Company, George Staats, 74 Bayard street, Brooklyn, N. Y.; Alloy Foundry & Machine Company, Mr. Wollheim, 73 Cedar street, New Rochelle, N. Y.; McGee Iron & Brass Foundry, Fred Russell, 51 6th avenue, Long Island City, N. Y.; Chas. Cory & Son, Inc., John M. Cory, 290 Hudson street, New York; Brady Brass Company, E. Q. Conarton, 170 14th street, Jersey City, N. J.; L. Plaut & Company, 432 East 23rd street, New York; American Bronze Novelty Works, Benjamin Klinger, 246 West 23rd street, New York; Safety Car Heating & Lighting Company, Charles W. Dunlop, 206 Erie street, Jersey City, N. J., and Keystone Brass Company, Inc., 486 Greenwich street, New York.

FOUNDRY EQUIPMENT MANUFACTURERS' ASSOCIATION

The temporary association of foundry equipment manufacturers, effected at the Milwaukee convention last October, at the request of the War Industries Board, to appoint a war service committee to represent the industry, has decided to continue the organization in permanent form. It is known as the Foundry Equipment Manufacturers' Association and starts off with 25 members.

The executive committee consists of Vernon E. Minich of the Sand Mixing Machinery Company, New York; James T. Lee, Vulcan Engineering Sales Company, Chicago; F. G. Smith, Cleveland-Osborne Company, Cleveland; R. H. Bourne, Whiting Foundry Equipment Company, Harvey, Ill.; and Elmer E. Rich, Rich Foundry Equipment Company, Chicago. The officers are Vernon E. Minich, president; F. G. Smith, vice-president, and A. O. Backert, secretary and treasurer.

The objects of the association are: to foster better trade practices, to reform abuses existing or arising in the trade, to diffuse reliable and accurate trade information, to eliminate excessive costs due to unnecessary multiplicity of styles and types of equipment, and to lend full strength toward co-operating with other business associations with an idea of improving, strengthening and stabilizing the business interests of the country, are the objects of the new organization.

The following named companies are members of the new organization: Champion Foundry & Machine Company, Chicago; Berkshire Manufacturing Company, Cleveland; Dayton Molding & Machine Company, Dayton, Ohio; American Molding Machine Company, Terra Haute, Ind.; International Molding Machine Co., Chicago; Cleveland-Osborne Manufacturing Company, Cleveland; E. J. Woodison Company, Detroit; Arcade Manufacturing Company, Freeport, Ill.; Vulcan Engineering Sales Company, Chicago; Grimes Molding Machine Company, Detroit; Buch Foundry Equipment Company, York, Pa.; United States Molding Machine Company, Cleveland; Sand Mixing Machine Company, New York City; Rich Foundry & Equipment Company, Chicago; New Haven Sand Blast Corporation, New Haven, Conn.; Pangborn Corporation, Hagerstown, Md.; J. W. Paxon Company, Philadelphia; McLeod Company, Cincinnati; Blystone Manufacturing Company, Cambridge Springs, Pa.; National Engineering Company, Chicago; American Clay Machinery Company, Bucyrus, Ohio; Young Bros. Company, Detroit; White Foundry Equipment Company, Harvey, Ill.; S. Obermayer Company, Chicago, and the P. H. & F. M. Roots Company, Connersville, Ind.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

Hugh McPhee is now in charge of the brass foundry of the Norwalk Foundry & Machine Company, Norwalk, Conn.

W. P. Putnam, Major of Ordnance, U. S. A., has returned to Detroit, Mich., to resume his activities as president and general manager of the Detroit Testing Laboratory of that city.

J. C. Oberender, formerly with P. & F. Corbin Company, New Britain, Conn., is now connected with the New England division of the Celluloid Zapon Company, New York, as salesman in western Connecticut.

Joseph M. Roth, who has been connected with the polishing department of the Remington Arms Company, Ilion, N. Y., has purchased half interest in the Centre Electro Plating Company, 177 Grand street, in partnership with D. Levine.

J. B. Mendenhall, formerly with the Great Western Smelting and Refining Company, St. Louis, Mo., is now sales manager of the Baltimore, Md., works of the Union Smelting and Refining Company, Newark, N. J.

N. A. Barnard, formerly with the Burns & Bassick Company, Bridgeport, Conn., has become connected with the Stanley Insulating Company, Great Barrington, Mass., manufacturers of the Ferrostat vacuum bottle, as foreman of the plating department.

T. F. Slattery, who was on the Electro-Plating Staff, Division V, Section 2, Chemistry of the Bureau of Standards, Washington, D. C., has been released from Government service and is now connected with the P. & F. Corbin, New Britain, Conn., as foreman plater.

Archie MacDermid, for the past six years with the J. B. Ford Company, Wyandotte, Mich., as field manager of the Industrial Department, has accepted a position with the Apothecaries Hall Company, Waterbury, Conn., as manager of the Manufacturing Department.

H. C. Flanagan, for the past nine years connected with the lacquer sales department of the Celluloid Zapon Company, New York, N. Y., has resigned and accepted a similar position with the Maas & Waldstein Company, 92 William street, New York, manufacturers of M & W lacquers.

Robert S. Perry has resigned as president and director of the Kalbfleisch Corporation. Mr. Perry is leaving for his plantation at Cove Spring, Ga., for the recuperation of his health. Franklin H. Kalbfleisch, chairman of the Board of Directors of the Kalbfleisch Corporation, has been elected to the office of president.

W. S. Quigley, president of the Quigley Furnace Specialties Company, Inc., New York, sailed for Liverpool on the BALTIC, February 15, for the purpose of further developing European connections of his company. Mr. Quigley will spend several weeks in England, France and Italy and visit the plants installing the Quigley system for preparing and burning pulverized coal and lignite.

Louis Gloe, Two Rivers, Wis., for many years associated with plant No. 3 of the Aluminum Goods Manufacturing Company, Manitowoc, Wis., is now secretary of the Leyse Aluminum Company, Kewaunee, Wis., which recently changed its name from Aluminum Sign Company and increased its capital stock from $75,000 to $200,000 to finance a general expansion scheme.

Lieutenant Sigfried Roebling, of Bernardsville, N. J., has received an honorable discharge from the United States army and has again resumed his position with the John A. Roebling's Sons Company, at Roebling, N. J. Lieutenant Roebling was born in the south and is a grandson of Colonel Washington A. Roebling, of Trenton, the president of the big Roebling company, and he is a great grandson of the late John A. Roebling, builder of the Brooklyn bridge.

Herbert R. Dryfoos, president of the Cleveland Alloys Company, Cleveland, Ohio, died of pneumonia at his home in Bratenahl. Mr. Dryfoos' connection with the Cleveland Alloys Company was his most important position in the local industrial world, but he was an officer in half a dozen other business concerns, and identified in one capacity or another with nearly a score of businesses all told. His rise in the local industrial circles, since he left Williams College in 1905 was remarkable, for he has attained his prominence before he was 33 years old.

Frank C. Miller, for twelve years traffic manager of the Bourne-Fuller Company, Cleveland, Ohio, and within the past year traffic manager in the Motors and Vehicles Division of the Quartermaster General's Department, has purchased the controlling interest of the Ohio Plating and Manufacturing Company, Cleveland, Ohio, from John A. Nally, who still retains an interest in the business. Mr. Miller is associated with P. F. Denning, proprietor of the Denning Manufacturing Company, and J. P. Harsh, who has been connected with the concern for many years has been retained as general superintendent. The company specializes in gold, silver, nickel, bronze, copper and brass plating.

John W. Watson has severed his connections with the American Bronze Corporation, Berwyn, Pa. Active management he turned over to M. C. Dittmann several months ago when he became director of publicity for the Philadelphia district, and later assistant chief of the Hispano-Suiza Engine Section of the Bureau of Aircraft Production. Recently he relinquished the presidency of the American Bronze Corporation, which he had held since the foundation of the business in 1906. However, he will retain his holdings and remain a member of the board of directors. He will be connected with a new company known as the John W. Watson Company. He has been succeeded by George D. Porter, Philadelphia, president; and by Matthew C. Dittmann, vice-president, treasurer and general manager. Edwin G. Anderson, advertising and sales manager, has been elected secretary; Charles H. Baker, formerly with the Timken Roller Bearing Company, Canton, Ohio, has been named assistant secretary and treasurer, and will be in charge of production.

DEATH

Joseph Sillman, president and founder of the Michigan Smelting & Refining Co., Detroit, died of pneumonia Feb. 15 at his home in Detroit. During the last 20 years he was prominent in developing the manufacture, smelting and refining of non-ferrous metals. He developed a business second to none of its kind in this country. Mr. Sillman was born March 9, 1870, and went to Detroit 25 years ago. He established the Michigan Smelting & Refining Co. in 1900. He was appointed a member of the Government committee directing the equable distribution of non-ferrous materials and the reduction of waste of these materials during the war. He was also active in the Government work of controlling the distribution of tin during the serious shortage. At his death he was vice-president of the Peninsular Brass Works, secretary and treasurer of the Thiery & Kendrick Mfg. Co., and president of the Valley Smelting Co., Cleveland.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

MARCH 10, 1919.

Waterbury is the least affected of any Connecticut cities by the cancelling of war contracts. The gradual absorption of surplus labor by industries which are working on normal peacetime orders has been going on since December. It is estimated that there are 2,000 less workers employed now than there were in October, 1918. The large majority of these have left the city to return to their former homes. They are men and women who came to the Brass City at the beginning of the war to receive the high wages then prevailing.

Of 2,000 discharged soldiers and sailors who have applied for work at the local branch of the United States Employment Service, at present writing, 38 have not secured jobs. There have been found no employers who were not willing to take back their old help. It appears that many ex-service men are unwilling to return to their former positions and were placed in higher openings.

The manufacturers reduce their help by the questionnaire system. The employees who have other than themselves to support are kept on while workers not dependent are laid off first. Each employee, shortly after the signing of the armistice filled out a questionnaire informing the employer whether it was necessary for him to continue working.

In most of the instances the women had only themselves to support and in many cases it was brought out that even they had other means of livelihood than their present positions. Of course such women were laid off first.

The Rotary Club and Chamber of Commerce are co-operating with the United States Employment service. The organizations are canvassing the city for odd jobs for disabled soldiers.

Many discharged men who were gassed and prefer outdoor life were hired as chauffeurs through the efforts of the volunteer canvassers, and clerical work has been found for men minus one or both legs by the societies.—C. F.

Additional litigation with regard to the affairs of the Connecticut Brass and Manufacturing Co. promises to transform the case into one of the liveliest tried under bankruptcy law in Connecticut.

The case is scheduled to go before a jury trial in Hartford in April. Heretofore the creditors have united in their stand to drive the firm into bankruptcy and thus obtain what money they could. Attorneys Lawrence L. Lewis and John H. Cassidy of this city have been representing the creditors. They have appeared in court several times and questioned the firm's business methods, profits, etc., and have asked that the firm be declared bankrupt.

Certain creditors said to be represented by the law firm of Cummings and Lockwood and an attorney named Rosenberg of New York have entered the fight and are trying to prevent bankruptcy. Attorney John H. Cassidy when interviewed stated that he and Attorney Lewis are not anxious to drive the firm into bankruptcy. "The part that we object to," said Attorney Cassidy, "is that the figures seem to be camouflaged or there is something back of the whole matter which has not been brought out. Take for instance the receiver's report. The figures ($45,000) show the Connecticut Brass and Manufacturing Co. to be doing business on a more profitable basis than the American Brass Company, which doesn't seem probable to any one who knows the brass business. If the profits are being rolled up at the rate of $45,000 a month as the receiver's report shows, there is no need for bankruptcy. The claims of the creditors can be paid and the proceedings halted. Another thing, Attorney Lewis and myself claim that William H. Cloverdale, receiver at the plant, has no right to accept notes in payment for merchandise."—M. W.

BRIDGEPORT, CONN.

MARCH 10, 1919.

Recovering in a great measure from its near-panic when the armistice was signed and many of the factories here shut down almost altogether, the city now has once more resumed its regular routine of manuafcturing business, although, it must be admitted, on not as large a scale as heretofore.

War contracts, held by almost every factory in the city, were either cancelled or curtailed seriously after the signing of the armistice, with the result that factories which had been working overtime and two and three shifts a day, cut down their production considerably, with a consequent cutting of the number of employees.

The Remington Arms and U. M. C. companies, practically one, shut down almost completely as soon as the armistice was signed, while other factories in the city took almost similar action. The one notable exception to this general rule of "cutting" was the Bridgeport Brass Company, which in spite of losing some war orders, made, if anything, an increase in their production rather than a curtailment. A formal statement made by the manager of the company was to the effect that the company would do all in its power to retain every man employed there at the same scale of wages and that it had already a sufficient number of "peace time" contracts to provide work for over a year.

Other factories in the city immediately took steps after the first near-panic to procure "peace time" contracts and orders, with the result that business once more approaches its "before the war" activity, in many cases, the factories surpassing in output their records of two or three years ago.

So optimistic are officials of the various factories of the city, including officials of the Manufacturers' Association, with regard to the labor situation of the city and business prospects for the coming spring and summer, that they are already predicting a labor shortage here by July 1. This, in spite of the fact that there are at present about 7,000 unemployed in the city.

Many of the men thrown out of employment by the signing of the armistice have already left the city to return to their previous homes where they think chances of employment are better than they are here, and fearing to remain in this city because of apprehension of a big cut in wages. This exodus has had a material effect on the unemployment situation in the city.

The most serious factor in the unemployment situation in the city was, of course, caused by the reduction in the working force of the Remington Arms and the U. M. C. company. The arms branch of the company employed during the rush of war time contracts about 12,000 people. It is almost safe to say that at the present time their payroll does not contain over 500 names. Rumors of converting the plant into an automobile factory, typewriter manufacturing plant, etc., have been rife for some time, but, so far, nothing definite has been done along these lines. Experimental work was done at the plant for a short time on the manufacture of a cash register, but this was finally stopped. The most probable fate of the arms plant seems at present to be that it will be converted into a government arsenal, although this rumor, like the others, cannot be definitely confirmed.

The U. M. C. branch of the company employed at the time of its greatest activity about 11,000 men, and at present its working force consists of from 3,000 to 4,000. This branch of the company has already returned to its peace time footing and work will continue at its present rate indefinitely.

The exceptionally large cutting in the forces of these two plants would no doubt have caused a far greater percentage of unemployment in the city now had not the majority of the men employed in the two plants been of the "floater" type, homes in other places, and attracted here by high wages. Most of these, when discharged, immediately rejoined their families in other cities in the country.

Taking a general view of the manufacturing industries of the city it is almost safe to assert that by mid-summer business will be booming along at a rate, which, while not up to war time standards, will be quite in excess of what it was before the European conflict broke out. Factory heads, universally throughout Bridgeport, state that they feel no ap-

prehension now about a scarcity of work for the coming summer months.—L. M. P.

TORRINGTON, CONN.

MARCH 10, 1919.

The general labor situation in Torrington is on the whole satisfactory. Few men are without jobs, although many of the shops are operating on shorter schedules and wages are correspondingly lower. Returning soldiers and sailors are securing work without any great difficulty. Many of them are being given their old jobs. Valuable service in placing these men is being rendered by the county office of the United States Employment Bureau, which has its headquarters in Torrington.

R. Dunscomb Sanford, superintendent of the office, in an interview with a representative of THE METAL INDUSTRY, spoke in the highest terms of the splendid co-operation rendered by the Torrington manufacturers in the employment of returning service men. Mr. Sanford stated that out of 208 soldiers who applied for work through the bureau, 194 had been placed in factories in Torrington and elsewhere in the county, and four had been placed in plants outside the county. This showing compares most favorably with the records of the other government employment agencies in the state. During the month of February alone, 104 applicants for employment registered at this bureau. All but two of these were placed.

There is a fairly good demand here for skilled and semi-skilled workers, both men and women. In but few, if any instances, has it been necessary to lay off women workers in order to make places for returning soldiers. Generally speaking there is a shortage of female help throughout the county. When the METAL INDUSTRY man visited the employment office on February 28, Mr. Sanford stated that he then had jobs open for 35 semi-skilled women workers.

During the latter part of February the bureau was given the task of placing some 200 men laid off at the Coe Brass Branch of the American Brass Company. They had been employed on night work. Increasing demand for farm laborers and a demand for 75 men at a big ice cutting plant at Bantam Lake helped the bureau to solve this problem without delay.

Discharged soldiers are returning to Torrington at the rate of about 200 a month, according to an estimate made by a local man who is in close touch with the situation.

Most of the Coe Brass Branch of the American Brass Company is now operating on a five-day, eight-hour schedule. The Progressive Manufacturing plant late in February also adopted an eight-hour schedule and it was expected that the Turner & Seymour Manufacturing plant would shortly do likewise. At the Excelsior Needle and Union Hardware plants some departments are working overtime. The Hendey Machine plant is on a nine-hour schedule.

The officers of the Hendey Machine Company, according to the annual report filed with the town clerk during the past month, are president and treasurer, Frederick F. Fuessenich; vice president and general manager, Charles H. Alvord; assistant treasurer, Frederick W. Fuessenich; secretary, Fred N. McKenzie; assistant secretary, John Jack; directors, W. E. Fulton and Truman S. Lewis of Waterbury, Frederick F. Fuessenich, Charles H. Alvord and Robert C. Swayze.

Louis G. Kibbe, formerly president of the Turner & Seymour Manufacturing Company of Torrington and later general manager of the Stamford Rolling Mills plant at Stamford, is to move his family to Texas, where he will be employed by the Cleveland Traction Company.

William E. Besse, superintendent of the Coe Brass Branch of the American Brass Company, has been elected president of the newly organized Company M. Veterans' Association. Major Besse was the first captain of the company which is now a unit of the 102nd Regiment of the famous Yankee Division.—J. H.T.

NEW BRITAIN, CONN.

MARCH 10, 1919.

Without exception, the local factories are making every effort to replace soldiers who were employed in their respective plants when they left to respond to the call to the colors. Several hundred soldiers, sailors and marines, who have been discharged from the service, have already returned to their homes, and when they have applied to the factory in which they were employed at the time of their enlistment they have found a job awaiting them. There have been very few complaints, and these, when investigated, have been satisfactorily adjusted. Several men, recently returned from the service, have been refused jobs at certain factories, but explanations have shown that these men were not in the employ of that particular concern when they left, and the labor condition is such that the employers did not feel justified in taking them. In other concerns where ex-service men were employed there have been numerous instances where new jobs were created that the veteran employee might return. The female labor problem in this city is not a great one. Even during the stress of war, when there was a shortage of labor, the jobs which were given to so many women were emergency jobs on emergency orders, and as soon as the emergency had passed the orders were no longer effective, the women were released and conditions returned to their former footing. During the past month, the New Britain Machine Company was suddenly confronted with a special government order for machine gun tripods. A shift of employees to burr the tripods was needed, but the nature of the work was such that more than thirty cents an hour could not be paid. Men declined to work for that rate, and as a result, the factory received permission from the United States Employment Service to again engage the women who had worked on these jobs during the war. But as soon as the order is completed the women will again be released.

During the latter part of the month the figures regarding the labor situation in this city were not as pleasing as previously. Figures given out by the United States Employment Service showed a decrease in the number employed in the factories of New Britain and nearby. The exact decrease during the last week of February was 75, and during the following week 112 more are to be added. Figures compiled here show that in this district, on Saturday, February 22, there were 25,519 hands employed in the factories, while the number of anticipated employees on March 1 was 25,529 Three factories anticipated a decrease in the working force, while 33 expected slight increases.

Generally speaking, business conditions at the local factories are far from brisk, due to the uncertainty of the reconstruction period following the war. The P. & F. Corbin Division of the American Hardware Corporation as well as the Russell & Erwin Division and the Corbin Screw Division of the same concern, have been compelled to drop from a 10-hour to a nine-hour day. The Fafnir Bearing Company has adopted an eight-hour day as has the Machine Company, while the Stanley Works has gone onto a nine-hour day. Landers, Frary & Clark, which has been operating a branch factory in Collinsville, had disbanded this branch plant entirely, and the Peck & Young Company, which had a branch of its Forestville factory here, has closed that division. At the Trumbull Electric Company business appears good and some departments are working nights. The Rockwell-Drake Company is also fairly busy and operates three eight-hour shifts.—H. R. J.

PROVIDENCE, R. I.

MARCH 10, 1919.

Business in all the metal lines continues brisk although there is not the great hustle and bustle that has characterized the situation for nearly four years past. In many respects the situation is rapidly approaching normal, and it is expected that this plane will be reached before many months. There is every indication that for many months to come there will be a steady and consistent activity in all lines of metal work, especially all those in any way connected with machinery and building operations. With the raising of embargoes on metals, materals and supplies, the users of them experience a considerable easement and so are able to gauge their output more accurately than has been the case for a long time.

The general tendency on the part of employers of labor in all lines of business in Providence and vicinity is to find places for all returning soldiers and sailors, showing preference to former workmen. Throughout the industrial sections of this city manu-

facturing concerns are conspicuously displaying cards that read to the effect that they will employ 100 per cent of their employes returning from service, and it is understood that this policy is being very generally adhered to.

Providence is especially fortunate in being a community of diversified industries so that the readjustments do not so materially affect any particular line, as in the case of many other centers. For instance, the jewelry and textile industries furnish employment for several thousand women in normal times. During the war period a large percentage of these found employment with concerns making munitions, etc., or filling places vacated by men who had joined the colors or been attracted to other occupations by the abnormally high wages offered.

With the closing of the munition factories and the increasing activity in the jewelry business, former employees have turned again to their old occupations. Consequently, the number of unemployed in this city is smaller comparatively, than in many places and the assimilation becomes gradual, natural and apparently, complete.

The labor problem, which has been a great handicap for the manufacturers for many months is also righting itself. The returning hundreds of young men from service are applicants for positions and the shortage of help is rapidly diminishing. These changing conditions are reflected in the downward trend of prices and the stabilization of the situation is steadily going on. As yet the 48-hour a week working schedule has not materially affected the metal trades, although it has taken a firm hold on the textile lines, and is slowly spreading into other industries, and will no doubt, eventually reach the metals.

From all accounts the jewelry industry in this city and vicinity was never more prosperous than it is at the present time. Failures have been few throughout the country the past year compared with previous years, and there is said to be a steady demand for all classes of jewelry and goods made from the precious metals. And a gratifying feature of this condition in the jewelry business is the very general expectation that it will continue indefinitely and increase rather than diminish.

The Excell Manufacturing Company of this city has received a charter from Secretary-of State Parker to engage in the manufacture of jewelry and deal in jewelers' findings. The capital stock is $50,000 and the incorporators are George J. Sheehan of Cranston and George F. McCanna and Aylesworth Brown of this city.

The Allied Finishing Company is a new concern that has recently started a japanning and enameling business at 77 Page street, in this city, with Frederick Stockwell, for a number of years in charge of the enameling department of the Metal Products Corporation, as general manager. The plant of the new concern is modernly equipped to do all kinds of enameling and japanning, in all colors, on jewelry and will make a specialty of black and white work, particularly for mourning goods.

The B. & G. Sheet Metal Company has removed from 948 Westminster street into their new building, 1107-1115 Westminster street, where they have nearly double their former capacity and the very latest and up-to-date machinery for executing prompt and serviceable work. In addition to their regular sheet metal work they have established a first-class welding, brazing and cutting department under the management of W. Lewis.—W. H. M.

ROCHESTER, N. Y.

March 10, 1919.

Despite the fact that there are about 5,000 men and women out of employment in this city at the present moment, the general trend of business throughout the manufacturing districts is gradually increasing in all lines and will soon have returned to normal conditions as existed prior to the entrance of the United States into the war. In fact, the plants included in the Eastman Kodak Company, the biggest industry in Rochester, have about attained normal conditions already.

The reason for so many men being out of employment here just now is explained from the fact that war conditions induced hundreds of women to leave other lines of employment —work with which they had been identified with for years— to seek more profitable fields of usefulness in the more important industries. Women left laundries, stores, offices, and restaurants to seek better wages and even shorter hours in the industrial institutions making war materials, etc. With the shutting down of these war industries, many have been thrust out of work. And the large majority of women who have taken men's places here and there, particularly the jobs formerly held by drafted men, absolutely refuse to vacate. In many cases it has been found necessary to discharge women and girls, whose services in the first place were of a temporary character and so understood, in order that returned soldiers might be provided with the old positions.

Of course it is undeniable that the women feel that insomuch as they performed a patriotic duty in trying to take the places of men called to war and made good they are entitled to some consideration in the matter of making way for returned soldiers. The situation has got to a point here in Rochester where an appeal has been made to women to give up the jobs held by them where much heavy work is required The United States Employment Agency has taken a hand in the campaign, because of the fact that hundreds of men will soon be arriving in the city from France.

The attitude of most manufacturers toward re-employing the returning soldiers is encouraging. In most every plant in the city genuine efforts are being made to give a preference to returning employes. It is especially true at the kodak plants, where every former employe is given work. If he cannot be placed back in his old position, he is provided with one equally as good and with as good a wage. The Eastman Company will provide work for additional men later in the year.

A new building, six stories in height, to be built of reinforced concrete, is planned by the Eastman Company at the main works in Kodak Park. It will cost $350,000, and is to be built at once.

Shipping facilities both in and out of Rochester are practically normal again, much to the delight of the big manufacturing interests who have had much to contend with during the past couple of years. It is expected that in two weeks railroad conditions will be back in the same shape as existed prior to the war.

The outlook for business in general in Rochester is exceedingly bright, and a very prosperous season is anticipated in every line of industry.

Manufacturers say there is a rare opportunity here for the establishment of a wholesale business in metals. Buffalo is the nearest city possessing such a concern. Inasmuch as Rochester's manufacturing importance is expanding so rapidly, it is indeed surprising that such an enterprise is not provided in this city.—G. B. E.

ROME, N. Y.

March 10, 1919.

The metal manufacturers of Rome were quick to respond to the suggestion that returned soldiers and sailors be reinstated in their old positions. At a recent meeting of the Rome Manufacturers' Association the following resolution was unanimously adopted:

"We, the directors of the Rome Manufacturers' Association believe that it should be the policy of its members to re-employ all men who left their employ in good standing for the purpose of entering the military service of the United States even if, in special cases, it may be necessary to dismiss some of our present employees in order to carry out this program."

Going into the matter in greater detail, the following statement was issued at the association's offices:

"The returning soldier, sailor or marine is a problem that confronts every community at the present time and the Manufacturers' Association of Rome wishes to co-operate in every way possible with all societies and organizations interested in this work. The association feels that the policy as outlined is justified by the fact that these men left their employ to enter the service of the government and while so engaged sacrificed good wages and suffered for their country while many other workmen were living in peace and receiving all the benefits of high wages. Returning soldiers, sailors and marines previously employed by members of the Rome Manufacturing Association should be instructed to report to their former employer or to

the office of the association, 116 E. Dominick street, where they will receive a welcome, and every assistance will be given them to secure proper employment. One of the primary objects of our association is to aid factory employees in all relations with their employers."

Samuel Powell, recently with the Colt Patent Fire Arm Manufacturing Company of Hartford, Conn., as employment manager, is secretary of the Rome Manufacturers' Association.

Practically all women shop workers who found employment in the metal industries of this city during the stress of war work have been released. Two reasons are assigned for this move. First, the dropping off in business, and, second, the desire to spread whatever work exists among the permanent men workers of the various plants.

Almost all of the shops in Rome at the present time are working on curtailed schedules, 40 hours weekly being the rule, which gives employment to the bulk of workers hereabouts. There are, however, some few hundred unemployed men in this city, and it is difficult to determine when conditions will afford opportunity for their absorption. It is hoped that another month or two may see manufacturing conditions in a more normal and settled state, and mills running close to peace-time schedule.

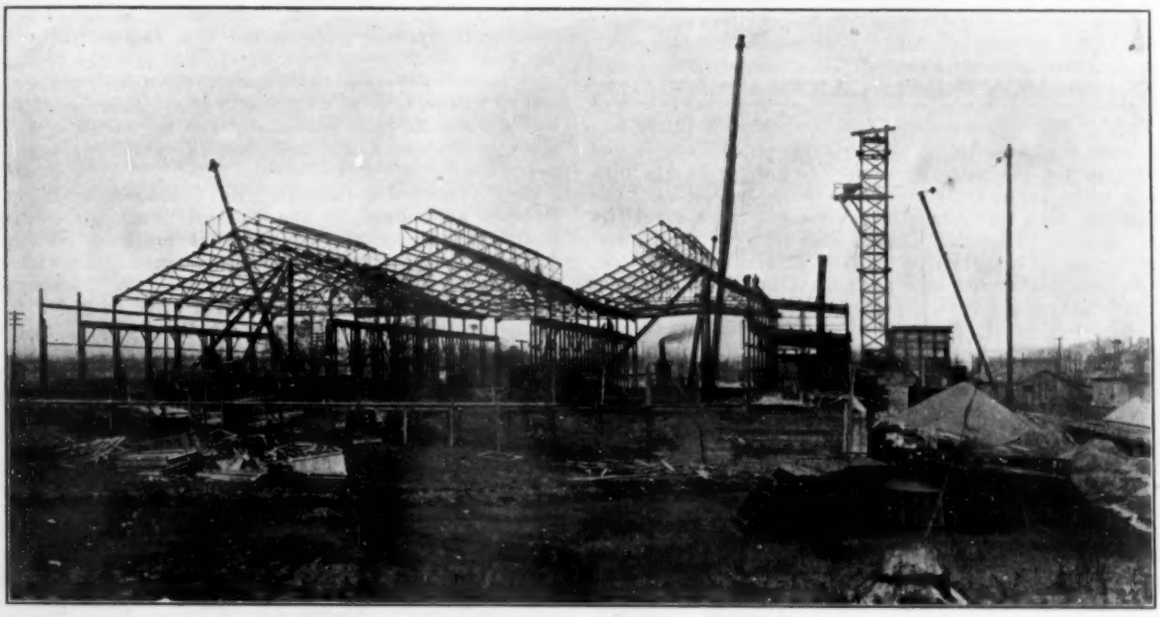
Representatives of the War Labor Board held a hearing in this city on Feb. 21, in conneceion with a demand by machinists and toolmakers for an eight-hour basic day and an increase in wages. The Board was represented by Director of Hearings F. G. Gump and Examiners M. F. Donahue and J. F. Keiman, all of Washington, D. C. After hearing the men's case, which was presented by a number of the workers, and listening to statements of out of town union officials, briefs were submitted by the manufacturers and the hearing was adjourned, the Board announcinng that a decision would be rendered later.

The annual meeting of the stockholders of the Rome Manufacturing Company was held at the office of the company at 11 o'clock on Wednesday morning, Feb. 12, at which time the following directors were elected: Dr. W. L. Kingsley, Barton Haselton, W. B. Johnson, E. L. Spriggs, P. C. Thomas, C. P. Drake and Joseph M. Read. The inspectors of election were H. J. Rowland and W. W. Parry. At a subsequent meeting of the directors the following officers were elected: President, W. L. Kingsley; vice president, W. B. Johnson; secretary, treasurer and general manager, P. C. Thomas; assistant treasurer and general sales manager, C. P. Drake; assistant secretary and sales manager of the locomotive department, Arthur Whyte; general superintendent, E. L. Spriggs; executive committee, W. B. Johnson, chairman; W. L. Kingsley, P. C. Thomas.—M. J. D.

CLEVELAND, OHIO

MARCH 10, 1919.

Complete reversion to peace time production in the metal industry of this city is apparently as far off as it was a month ago. By easy stages all plants which had been engaged in war work, and this means practically every manufacturing establishment in the Cleveland district, have been turning back to peace time production, largely with a view toward keeping business normal, and this means employing the maximum number of workers in this city, and especially the returning soldiers. There are, however, a number of plants in this district which still are engaged in munitions production, presumably for the contemplated standing army of one and one-quarter million men. These plants are going ahead with the war production, meanwhile waiting final outcome of the standing army plan. The Van Dorn Iron Works Company is still turning out miniature tanks, but at the same time is producing in ever increasing quantity its principal peace time product, metal furniture. The American Multigraph Company still is turning out naval fuses, and this material probably will be used for Panama Canal defenses, if not for regular naval requirements. One of the largest producers of war time needs, the National Acme Manufacturing Company, is least affected by the changing conditions. This firm, according to A. W. Henn, secretary-treasurer, has been making Liberty motor parts for the government. With practically little change the plant and equipment now are able to turn out motor car parts for passenger and commercial and industrial vehicles.



THE PLANT OF THE UNITED STATES COPPER PRODUCTS COMPANY OF CLEVELAND, OHIO, AS IT APPEARS TO-DAY.

That all war time production is not ended, or rather that the United States Government seeks to be prepared for its various needs until ultimate peace arrives, is illustrated by the announcement of awarding of contracts totaling millions, which will keep many other plants busy on these items alone for the next three or four months. The following firms have been authorized to produce the accompanying government supplies: Globe Machine and Stamping Company, electric lighting fixtures; Grant Motor Car Corporation, anti-air craft trailers and plans for ten-ton trailer chassis; West Side Castings Company, metal wheels; Peerless Motor Car Company, spare parts for 400 heavy duty Peerless trucks; White Company, spare parts and appliances for the White 1½-ton trucks; Standard Parts Company, springs and parts.

By far the biggest subject yet confronting the metal industry here since the armistice was signed is that of employing the returning soldiers. Cleveland industry as a whole

is believed to have adopted the most comprehensive program for lessening the possibility of unemployment for all kinds of labor. Through the activities of a special commitment of the Cleveland Chamber of Commerce, this phase of industry has been put squarely up to manufacturers upon a patriotic basis, and the response has been noble. But the committee, according to Alexander C. Brown, of the Brown Hoisting Machinery Company, proposes to go still further by providing a comprehensive plan to aid both industry and labor alike. The plan is the outcome of a special meeting attended by 100 manufacturers in all lines of industry. The first step to be taken is to warn all soldiers who are not Clevelanders of the real labor situation here, with a view toward assisting first the veterans who are coming home and are entitled to first call, upon the jobs they left, but at any rate upon any job.

It must not be taken for granted, however, that there is an extreme dearth of positions open. The highest estimates, and these seem to be based upon none too careful investigation, are 75,000 men in all forms of labor out of work. Under normal conditions, it is pointed out, the maximum number of employees in all forms of labor has been 300,000. Using present output as a basis, it is claimed the number of regulars unemployed could hardly be more than 30,000, and that adding 10,000, a very high figure, for the number of floaters not employed, the highest number out of work would be only 40,000, or about half of the high figure estimate.

MONTREAL, CANADA

March 10, 1919.

The high tension activity that has prevailed here in the metal trades for the past three and one-half years has now got back to its normal condition. A sharp decline has been recorded this past two weeks in the metals, more especially in ingot metals. Lead has sagged one cent per pound and tin has come in for revision to lower level also. Solder has remained unchanged this past week but lead pipe and lead waste are down 1 cent per pound in eastern markets and 3 cents out West.

It has been announced that the Montreal Locomotive Company has secured a fresh order for forty locomotives for the South African Railway, also they are at present turning out two locomotives per day on an order for 250 for the Italian Government.

The Canadian Locomotive Company has received a new Canadian order for locomotives with the prospects of the order being increased.

Owing to the large amount of copper and brass entering into the construction of a locomotive it will lead to the consumption of a large amount of metals. Lower prices have been named on plumbing and steam brass goods. It is indicated this is largely on account of competition creeping in, and whether the basis will be maintained is a question at present.

Owing to the ports of Great Britain being closed temporarily for the importation of goods it has been the means of affecting the production of brass goods here this past month, as some of the brass manufacturers here are large exporters of steam brass goods and maintain stores in the leading cities of Great Britain for the distribution of their products. Rapid progress has been made in the construction of the one million dollar plant of the Canadian Crane Company, a subsidiary of the United States Company, and the machinery and tools for installation will soon begin to arrive.

The new additions of the Jenkins Brothers Company, Ltd., have been completed and new equipment installed. These improvements have been in progress for the past six months and they have now one of the most modern fireproof pattern and storage shops on the American continent equipped with the latest machines for manufacturing and storage, also for the handling of patterns.

The employees have been furnished modern, sanitary, reading, recreation and rest rooms, which shows the spirit of co-operation that prevails between them. Some concerns feel that prices may still go lower on manufactured goods and then react with the advent of the spring season.
—P. W. B.

CINCINNATI, OHIO

March 10, 1919.

Among the machinery trades, Cincinnati's largest consumers of metals, business has continued extremely quiet up to this writing, the let-up in demand coming with the end of the war being still in evidence. However, there is not lacking some indication that the end of this holding-off attitude on the part of manufacturers needing special equipment is in sight, as inquiries are increasing in number, and bid fair to develop into a volume of actual orders which will lift the tool factories out of the comparative inactivity which has prevailed for several months. Moreover, foreign inquiries are of a number and volume to prove strikingly the eagerness of other countries to get back into the normal swing of business as soon as possible. Transportation difficulties are considerable, in spite of reduced freight rates in some instances, and credit arrangements are in course of investigation, to determine how best to finance purchases of foreign buyers; but, on the whole, it can be said that the prospects for foreign business are such as to furnish ample ground for optimism on the part of the trade. With domestic manufacturers in many lines now able, for the first time in more than four years, to secure needed equipment, about all that is needed to make business good is the actual resumption of buying; and this, it is pointed out, will take place as soon as the country in general is convinced that commodity prices are not going much lower immediately, and that the best possible way to avoid widespread unemployment and the evils connected with it is to go ahead with business at once. The tool builders are far from pessimistic, and are awaiting with complete confidence the resumption of activity along normal peace lines.

Many Cincinnatians are interested in the monograph contests recently announced by the National Industrial Conference Board on subjects relating to the best means of increasing industrial efficiency through the adjustment of wages to production and by other means of increasing the contentment of workers. It will be recalled that a prize of $1,000 is to be given for the best monograph on the list of subjects suggested along these lines, the contest to end on July 1. A number of entries will undoubtedly be made from Cincinnati, where in some of the largest concerns great progress has been made, along original lines, in solving the problems to be discussed.

Cincinnati machinery manufacturers are much gratified at the expressions in the recent report of a special committee of the National Metal Trades Association, in which the training of industrial workers in what is known as a "vestibule school" is commended. Much of the committee's investigation work was done in Cincinnati, and the use of vestibule schools in Cincinnati, Dayton and other industrial centers in Southern Ohio furnished much of the favorable evidence discovered by the committee.

The Edna Brass Mfg. Co., one of the leading brass foundry concerns in Cincinnati, has leased for office purposes exclusively a building on Reading Road across from its plant, taking a five-year term on the property. The company's expansion during the past two or three years has been considerable, and its move into new office quarters is for the purpose of enabling a still further expansion of its manufacturing facilities.

The Warman Aluminum Casting Company, successor to the Aluminum Casting Company, of Covington, Ky., has secured 5,000 square feet of space at 1312 and 1314 Dayton street, and will shortly move its plant over to Cincinnati. A considerably larger production will be possible in the new quarters.

According to Charles Ellerhorst, of the American Copper and Brass Works, the coming of nation-wide prohibition will not by any means put out of business his concern and others which have for years found a steady demand from the distillers and brewers for copper equipment. Mr. Ellerhorst says that, on the contrary, the foreign demand for such goods, coming from countries where prohibition will probably never prevail, especially South America, will go far toward keeping business up to the mark, while the domestic demand for copper equipment in other industries than the liquor trade

furnishes and will continue to furnish a strong and profitable business.

The Michaels Art Bronze Company, of Covington, Ky., has filed amended articles of incorporation which increase its capital stock from $30,000 to $60,000, in order to enable it to increase its business. President Frank L. Michaels and other officers of the company signed the amended articles. —K. C. C.

COLUMBUS, OHIO

MARCH 10, 1919.

The metal market in central Ohio territory continues quiet in every regard. Buying is now limited to actual needs and there is no disposition on the part of metal using concerns to lay in a supply for the future. Concerns are rather slow in getting on a peace basis and consequently the demand has fallen off to a large degree. Shipments coming into the city are generally small and everyone is now trying to clean up.

Prices are somewhat unsettled. In fact there is a good deal of divergence in quotations heard in this locality. Sellers are often anxious to dispose of stocks or are inclined to shade quotations for that purpose. The strongest point in the market is the demand for typemetals which have not declined as much as other varieties. Brass and copper are both rather weak and the same is true of aluminum and tin.

Metal using concerns are generally taking back returning soldiers as fast as possible. Of course many of them have been curtailing their working forces and thus some delay is caused in taking back returned soldiers. But the policy of all of the Columbus concerns is to provide a job for all returning soldiers and many have been given positions, in some cases even better than they held at the time of entering the army. The principal metal using concerns in the city are the Jeffrey Manufacturing company, the John W. Brown Company, the Kinnear Manufacturing Company, and the Columbus Die, Tool and Machine Company.

The Palmer-Donavin Manufacturing Company has succeeded the Carman Manufacturing Company, and has taken over the factory and office at 76 East First Avenue, Columbus, Ohio. The Carman Manufacturing Company was chartered in 1905 and until 1913 was engaged in the jobbing of metals. In 1913 the Columbus Tinware and Can Manufacturing Company owned and operated as a department of the Quad Stove Manufacturing Company, was merged with the Carman Manufacturing Company. Fred L. Palmer is president and salesmanager of the Palmer-Donavin Manufacturing Company and George B. Donavin is secretary and general manager.

The Central Stamping & Metal Spinning Company, of Dayton, has been chartered with a capital of $10,000 by James F. McBarron, L. W. McBarron, Charles E. St. John, Mabel McBarron and Ella McBarron.

The authorized capital of the Republic Brass Company, of Cleveland, has been increased from $25,000 to $160,000.

The Cleveland Machine & Stamping Company, of Cleveland, has been chartered with a capital of $10,000 by B. L. Mallory and others.

The Hamilton Metals Products Company, of Hamilton, O., has been incorporated with a capital of $30,000 by Louis M. Piker, Jos. H. Schlichter, Philip Piker, Rose Piker and Emma Schlichter.

The capital of the Ideal Metal Company, of Cincinnati, has been increased from $25,000 to $50,000.—J. W. Lehman.

DETROIT, MICH.

MARCH 10, 1919.

Business conditions in the metal trades are looking somewhat better the last two or three weeks in this vicinity. The big slump that was feared several weeks ago has yet to materialize, although there is that uncertainty about everything that does not tend to increase confidence that a revival of trade conditions are very near just at present.

The automobile business is showing a gradual revival and many of the large companies are producing quite heavily. The Ford Motor Company is said to be working almost to capacity. The same is also reported of the Cadillac Motor Car Company. and the Packard Motor Car Company. The automobile production in Detroit will be heavy this year, although it is not believed it will come up to that just preceding the time the United States entered the war.

It is understood the Packard Motor Car Company is planning to go quite extensively this year into the manufacture of airplanes. This company is reported to be preparing an extensive advertising campaign in the interest of this particular branch of its motor industry.

There seems to be a general tendency to mark time for a while in the brass, copper and aluminum industry until conditions become more settled. The automobile companies are practically the salvation of this particular branch of industry at the present time.

Labor conditions are much better at present than at any time for several weeks. It is reported that the surplus labor that nearly swamped the Detroit industries a few weeks ago has almost been absorbed through efforts made by those manufacturers who are able to keep up production in spite of adverse conditions. Much of this labor has been absorbed by the automobile companies. The advice is, however, for outside labor to make no attempt at present to seek relief in Detroit. The city has all it can do to hold its own.

The Chausse Manufacturing Company, with offices and plant at Russel street and Davison road, is now engaged in the manufacture of kerosene blow torches which are reported a comparatively new departure in this line. The kerosene torch is said to eliminate all possibility of explosion and is found more desirable and successful than most of the old kind. The company formerly was at 535 Fifteenth street until a short time ago when it moved to the new plant at its present address.—F. J. H.

MILWAUKEE, WIS.

MARCH 10, 1919.

Watchful waiting seems to be the policy in metal trades circles in Milwaukee. Trade is not brisk and there are no signs pointing to renewed activity. Manufacturers are still "up in the air" regarding new contracts, prices, etc., and until the after-war business takes definite shape, manufacturers will just worry along.

A thorough survey of the situation was given by R. P. Tell, president of the Milwaukee Metal Trades Association, in an interview in which he pointed out, briefly, that business men cannot figure on the future until the peace congress ends its work and the complete terms of agreement are known.

Mr. Tell, who is also president of the National Brake and Electric Company, said that his company has been paying a bonus of 10 per cent to all its men who have been with the company a year, but that this was converted into a straight advance in wages since the first of the year, so that, for example, where a man has been paid 40 cents an hour, he now receives 44 cents.

"We realize that it would not be fair to ask men to work for less while the cost of living is still high," he said. "Here is where I believe the government should take some action to improve conditions. The government has fixed the price of wheat and hogs and this what is keeping up the cost of living.

"On the other hand the government is cancelling contracts it had with the manufacturers, telling them it can buy their products at cheaper prices later on. Now, that is not a policy that will keep things moving and labor employed. We cannot work up stock for future demand because we have no room to store it.

"Some of our principal customers are the public utilities and the railroads, and everybody knows that they are having a hard time owing to rising costs. Another factor to be considered is the great expansion of facilities made by manufacturers to meet the government demand during the war. This enlargement calls for more business to keep the plants going than would have been required before the war. The overseas trade will not be as large as some people expect. During the war we have taught Europeans our strongest point—quantity production—and they will be quick to follow in our footsteps. With the wages lower over there, competition will be much keener."

The Milwaukee Metal Trades Association recently com-

pleted a questionnaire of 45 shops, showing a total of 35,629 persons employed on Nov. 1, 1918. The number, Feb. 1, was 32,835, a loss of 8 per cent. This was considered a good showing considering the uncertainty prevailing.

A new factory for the production of aluminum ware will be built by the Sheboygan Aluminum Company of Sheboygan, Wis., which will be incorporated for more than $200,000.

All employees of the Cutler-Hammer Company of Milwaukee, which produces electrical appliances chiefly, who have been in the service of the country, have been notified in writing that their jobs are open for them when they return.

Charles A. Paeschke, one of the founders of the Geuder, Paeschke & Frey Company, manufacturers of aluminum utensils, completed his fortieth year of bnusiness activity last month and received congratulations from many sections of the country. He has been head of the firm for a number of years.

R. P. Tell, of the National Brake and Electric Company, was elected president of the Milwaukee Metal Trades and Foundry Association at the annual meeting. J. D. Bird, of the Power and Mining Company, Cudahy, was elected vice-president, and W. J. Fairbairn was again elected secretary. Max Babb, of the Allis-Chalmers Company, and W. W. Coleman, of the Bucyrus Company, South Milwaukee, were elected as directors.—B. E. S.

are about 3,000 unemployed persons in Trenton. When the ban has been finally lifted from all building projects and with the approach of spring weather it is believed that there will be few unemployed.

The Wallmax Manufacturing Company, with offices at 523 Springfield avenue, Newark, N. J., has been incorporated with $125,000 capital stock, to manufacture electrical and mechanical equipment. The incorporators are Max Walther and Martha Walther, of West Orange, and Oswald Jentsch, of West Orange.

The New Jersey Cutlery Company, of Newark, N. J., has been incorporated with $100,000 capital stock, to manufacture and deal in cutlery. The incorporators are Robert Levy and Jacob Priedman, of Newark, and Leon S. Brach, of East Orange.

The Tillou Manufacturing Company, of 134 Washington avenue, Newark, has been incorporated with $25,000 capital, to manufacture fountain pens. The incorporators are Charles W. Tillou and Samuel E. Tillou, of Newark, and Eugene LaBoeuf, of Belleville.

Trenton metal manufacturers are greatly interested in the daylight saving law and have asked Congress not to make any change in the law. The manufacturers claim that the daylight plan is of great benefit to them and saves the expense of extra illumination bills. It is also contended that work-

A "VALENTINE" PARTY OF THE EMPLOYEES OF THE WESTINGHOUSE COMPANY, TRENTON, N. J., FEBRUARY 14, 1919.

TRENTON, N. J.

MARCH 10, 1919.

The Trenton metal manufacturers are living up to their promise made when the armistice was signed of reinstating to old positions employes who were called into the service of Uncle Sam. Each manufacturer announced to the Trenton Chamber of Commerce that employes who had to leave to enter the army or navy or those who voluntarily enlisted would find their old positions awaiting them. The Skillman Hardware Manufacturing Company has already given employment to six former soldiers. Recently the company received a letter from an employe who is in France asking if his job was still open and an affirmative answer was sent him. Other firms are following the same course. In a few places female help has been replaced with men who formerly held the positions, but it is not expected that there will be any general discharge of female help until after all the Jerseymen have returned from abroad. While women have made good to some extent, yet in one Trenton plant it was found that women and girls were handicapped in their work because they did not possess the strength of man in lifting certain articles. At the present time it is estimated that there men can perform better labor during the daylight hours. At a recent meeting of the Trenton Chamber of Commerce a resolution was introduced by the Manufacturers' Committee, and adopted, asking that Congress not repeal the measure. A copy of the resolution was telegraphed to all the New Jersey Senators and Congressmen at Washington.

The Jordan L. Mott Company, which had been handling big war contracts since the European war was begun, is now back to a pre-war basis again and the manufacture of ammunition is a thing of the past. The Mott company was practically the only Trenton concern to manufacture the deadly part of ammunition. The company turned out several ammunition contracts for the Allies and then later for the United States Government. Extra machinery was installed for this particular product and the company can probably use the machinery for other purposes. The ammunition workers were mostly women, who received big wages. All have since been discharged. The De Laval Steam Turbine Company is still working on government orders and is so busy that a night force has been inaugurated. The day employes are also working overtime. The company even placed girls and young men at work in the machine shops. Some were placed at work on the filing machines and others

on the lathes. Neither the noise nor the dirt nor the hundreds of men around them disturbed the girls, who go quietly about their tasks, accomplishing them with ease. Of the Mott company's 1,800 employes 200 were girls and women. They were attired in "bloomeralls." These outfits allowed them to work faster and were less liable to dangerous contact with swift moving machinery. The company kept a trained nurse in daily attendance. Special chairs were designed with high backs to obivate much of the strain of the usual factory bench. An emergency hospital was equipped for the female help. Different working hours were provided for them and they left and arrived at different hours than the men. This scheme protected them from being subjected to comment.

The employes of the Westinghouse Lamp Company recently made merry at a Valentine party given in the entertainment room at the plant. The scene was rendered festive by "Dan Cupid's" usual Valentine setting of red and white, prettily draped, amid hearts and hearts. The program consisted of dancing and games, while Barlow's jazz band furnished the music. George Erb was master of ceremonies and Philip Papier was chairman of the committee. Misses Ina Carey, Grace Decatur, Helen Gannon, Amy Johnson, Philla Dillon, Helen K. Ryan, Messrs. J. McDonald and W. C. McPherson assisted the committee.—C. A. L.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Nathan Manufacturing Company has discontinued its plant at 416 East 106th street, New York, and is now located at Flushing, L. I., N. Y.

Frederick T. Harris, Sandy Hook, Conn., announces that his wire mill is making a specialty of products which were formerly imported and that he will be glad to quote on scratch brush wire, round and flat, in all fine sizes and all metals.

The Loewenthal Company, 947 W. 20th Street, Chicago, Ill., and 23 Heyward Street, Brooklyn, N. Y., manufacturers of aluminum, brass, bronze and composition ingots, have trade-marked their products under the name of "LION BRAND."

William Rosenblatt, Incorporated, dealers in new and old metals, located at 262 Water street, New York City, have purchased the premises they occupy. These consist of a front and rear building occupying a full city lot, 4 stories, brick, 29 feet by 125 feet.

The Scovill Manufacturing Company, Waterbury, Conn., has made application to increase its capital from $5,000,000 to $15,000,000. The products manufactured by this company are brass, bronze and nickel-silver. In fact they make any thing that can be made of metal.

The Art Metal Works, 7 Mulberry street, Newark, N. J., has leased the buildings and property at South Orange and Morris avenues, to be used for works extension, storage, etc. It consists of main manufacturing building, engine house and other structures, about 60,000 equare feet in all.

The present officers of the **National Conduit and Cable Company,** Hastings-on-Hudson, N. Y., are as follows: H. J. Pritchard, president; G. W. Hawley, vice-president and mill manager; W. Stanley Eckert, vice-president and sales manager; George Bauer, treasurer; O. K. McMahon, secretary; W. J. Wiley, assistant secretary, and H. Jenkins, assistant treasurer.

The Sterling Wheelbarrow Company, of Milwaukee, Wis., is preparing to more completely serve the requirements of its customers by a large addition to its plant. This new addition will contain as much floor space as the present plant now occupies. The company also announces the opening of a Boston, Mass., office to handle its foundry line throughout the New England States. R. F. Jordan will have charge of this territory.

The Owosso Bronze Bearings Company, Owosso, Mich., which has begun operations in the Robbins Table Company, has completed its organization and the following officers have been elected: J. H. Robbins, president; James Van Pelt, vice-president and general manager; Albert L. Nichols, secretary and treasurer. The company manufactures bronze babbitt-lined bearings and operates a brass, bronze and aluminum foundry pattern room and brass machine shop.

To assist in bringing the skilled man and the "skilled" job together, the United States Employment Service, Department of Labor, has opened a practical demonstrating office, the first of its kind in the country, at 1184 Broadway, New York City. Here are being applied the latest and most approved methods of interviewing and placing skilled workers from the army, navy and war work plants, scientifically matching the man and the job. In temporary charge of this new development in placement work is H. A. Stevens of Boston, formerly district superintendent for the United States Employment Service for New England.

The Director of Sales of the War Department, Washington, D. C., has issued a chart of the organization which will dispose of all government surplus material. The divisions with their executives in charge that will interest readers of THE METAL INDUSTRY are:—Machine Tools, Lieutenant-Colonel A. La Mar; Building Material, Major W. M. Crunden; Raw and Scrap Materials, Captain A. L. Mercer, with C. G. Dickinson as assistant and Ordnance Supplies, Captain P. H. Senior. Mr. Dickinson, previous to his connection with the War Department, was New York representative for White and Brother of Philadelphia, Pa., and he is acting in an advisory capacity on raw metals, also scrap, passing on prices so as not to embarrass market conditions.

The Manitowoc Plating Works, Manitowoc, Wis., is erecting a building, 100 by 150 feet, which they expect to have completed by the first of April. It is expected that the building will cost between $10,000 and $15,000, with an additional $10,000 for equipment. The company will operate galvanizing, tinning, soldering, polishing and plating departments, grinding room and tool room. W. J. Wachowitz, president of the Manitowoc Plating Works, started in the plating business in a little building about 7 x 12 feet, three years ago, where he stayed for about six months. Mr. Wachowitz then purchased another building 28 x 40 feet, but after about a year found that he needed more space and purchased a three-story building, 40 x 70 feet. This latter building has also grown too small for the business and the company is now putting up the plant mentioned above.

The Bureau of Standards, Washington, D. C., by S. W. Stratton, Director, announces that they have on hand the following analyzed samples which will probably be of interest to the readers of THE METAL INDUSTRY:—sheet brass, tin, zinc and aluminum. The Bureau reports that from now on all samples for points in the United States or its possessions will be shipped by parcel post, C. O. D. Those for points in Canada, Mexico and other foreign countries will be shipped by express, C. O. D. The regulations of the Department of Commerce require that the payments for these samples be in the hands of government agents before delivery can be made. By using the parcel post exclusively the Bureau also hopes to make it possible for customers to send in their orders and pay for them through their own post office when delivery is made, and in this way make prompter shipments and avoid the necessity for refunds when samples ordered are out of stock.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture machinery, castings, etc. The Delta Foundry & Machine Corporation, New York, has been incorporated with a capital of $25,000, by F. J. McCaul, F. C. Reilly and J. F. Shea. The company has been in business for about a year and has had to increase its capital in order to take care of increased business. The company operates a smelting and refining department, brass, bronze and aluminum foundry, casting shop, and they are in the market for equipment for a sand blast room and also a reverberatory furnace.

BRIDGEPORT COMPANIES COMBINE

Announcement is made of the merger of the **Hawthorne Manufacturing Company** and the **Hamilton & De Loss, Inc.,** under the former name, with a capitalization of $1,500,000. The two companies have manufactured in their Bridgeport, Conn., plants bicycle and motorcycle lamps, spotlights, headlights, special metal goods, hollow ware, etc. The machinery of the Hawthorne plant will be removed to the new factory, which is on a 7-acre site in Fairfield. Officers of the company are E. W. Bassick, chairman of the board; H. H. De Loss, president; H. H. Hamilton and E. A. Hawthorne, vice-presidents; H. H. De Loss, treasurer; A. D. Sullivan, assistant treasurer; E. Horace Hawthorne, secretary.

PROFIT SHARING

Announcement is made by John H. Schumann, President of the **Hilo Varnish Corporation** (formerly Moller & Schumann Co), over fifty years a large manufacturer of varnish in Brooklyn, N. Y., of a profit sharing plan.

Mr. Schumann states that half the profits of the corporation will be distributed among all the employees annually; that each employee will receive a share proportionate to his salary or wage and the length of time the employee has been on the pay roll of the corporation.

Labor is interested when in addition to compensation for meritorious work there is further remuneration in proportion to what that labor has produced in profits, and as this plan covers the salesmen on the road, the men in the office as well as the laborer in the plant, it is expected that increased efficiency and elimination of waste will automatically result.

ELECTION OF OFFICERS

At the annual meeting of the Wolverine Brass Works, Grand Rapids, Mich., the following officers were elected: L. A. Cornelius, president; George G. Whitworth, vice-president; H. C. Cornelius, secretary and treasurer. Directors, the officers and Henry B. Herpolsheimer and Lawrence Cornelius. The company operates a brass, bronze and aluminum foundry, brass machine shop, tool room, cutting-up shop, spinning, stamping, galvanizing, tinning, brazing, soldering, plating and polishing departments.

The stockholders of the **A. Garrison Foundry Company,** of Pittsburgh, Pa., at the annual meeting held recently, elected directors as follows:

John H. Ricketson, Jr., Oliver G. Ricketson, Jesse R. Williams, Geo. W. Caulkett.

The officers of the company are as follows:

John H. Ricketson, Jr., president; Oliver G. Ricketson, vice president; Jesse R. Williams, general manager and treasurer; Geo. W. Caulkett, secretary, assistant treasurer and assistant to the general manager.

The president, John H. Ricketson, Jr., has been serving as a captain with the 315th Infantry, American Expeditionary Forces, in France. The captain was badly incapacitated by shell shock during the battle of the Argonne Forest, but is now rapidly recovering.

All of the officers are old employees of the company. The Messrs. Ricketson held the present positions during the late 90's. Mr. Williams comes from the accounting department, while Mr. Caulkett is transferred from the Engineering and Estimating department.

SCOVILL MANUFACTURING COMPANY

Officers and directors for the coming year were elected at the annual meeting of the **Scovill Manufacturing Company,** February 11. The financial statement covering the period from January 1 to December 31, 1918 with a comparative statement for the previous year was submitted at the meeting.

The officers elected are as follows: Mark L. Sperry, president; Edward O. Goss, vice-president; treasurer, and general manager; John H. Goss, secretary and general superintendent; C. M. DeMott, assistant treasurer; Leavenworth P. Sperry, assistant secretary. The directors elected were Mark L. Sperry, William E. Curtis, Henry W. Scovill, Edward O. Goss, John H. Goss, Clayton M. DeMott and Leavenworth P. Sperry.

The comparative financial statement shows the following:

ASSETS.	Dec. 31, 1918.	Dec. 31. 1917.
Land, buildings and machinery as of January 1:	$7,752,768.29	$7,390,950.31
Additions during year	4,114,003.60	2,946,072.98
	$11,866,771.89	$10,337,023.29
Depreciation	2,996,693.00	2,584,255.00
	$8,870,078.89	$7,752,768.29
Cash and certificates of deposits	2,791,402.40	3,604,453.06
U. S. Government securities	4,265,077.39	3,942,164.87
Other bonds and investments	2,524,424.78	3,747,320.18
Stocks in other companies	5,058.25	55,058.25
Accounts and bills receivable	2,841,965.72	4,720,027.72
Merchandise	6,672,936.29	7,122,743.26
	$27,970,944.72	$30,944,535.63
LIABILITIES.		
Capital stock	$5,000,000.00	$5,000,000.00
Surplus	15,096,103.55	8,316,219.88
Reserves, including taxes	4,000,000.00	.....
General reserves	.....	4,000,000.00
Reserve for taxes	.....	4,384,000.00
Accounts and bills payable	168,124.18	39,432.08
Unliquidated advances on contracts	1,575,813.91	.....
Net earnings	2,130,903.08	9,204,883.67
	$27,970,944.72	$30,944,535.63
Surplus December 31	17,227,006.63	17,521,103.55

PRINTED MATTER

Foundry Bulletin—E. A. Williams & Son, Inc., Jersey City, N. J., has issued No. 4 of their foundry bulletins which contains a number of pertinent and wise "Don'ts for Purchasing Agents."

Magnesium—The Shawinigan Electro Metals Company, Ltd., Montreal, Can., has issued a valuable little pamphlet devoted to magnesium. Considerable information is given regarding magnesium and its origin and some good advice is also given on foundry practice in using magnesium. There are also tables showing the physical and chemical properties of the metal, while a chapter is devoted to the description of the various alloys of magnesium, such as those with aluminum, tin, zinc, and iron. Copies of the book may be had upon request.

Annealing Furnaces.—The W. S. Rockwell Company, New York, has issued Bulletin No. 39, which is devoted to the description and illustration of their rotary annealing and heat treating furnaces.

The design of the furnace is that of a rotating horizontal cylinder with a refractory or metallic spiral lining, so that when material is charged in bulk into the charging-drum at one end it is gradually and automatically conveyed through numerous convolutions and at gradually increasing temperature to the other end, where it is automatically discharged at the exact time that it reaches its required tem-

perature. A concentric hood serves to automatically close the discharge opening except at the lowest point of revolution and time of discharge. The hood also serves to guide the material as it leaves the furnace.

The furnace is intended to handle, either for annealing, hardening, tempering, bluing or other heat treatment, any small pieces of like dimensions in either brass, copper, steel or other metals, such as cartridge shells, eyelets, ferrules, buttons, caps, cups, coin blanks, steel balls, saw teeth, tacks, screws, rivets, rings, springs, nuts, punchings, etc., in fact, any small pieces which will travel freely and pass through the openings without choking them.

Dixon's Graphite Products is the title of a new pocket catalog issued by the Joseph Dixon Crucible Company of Jersey City, N. J. While not so complete as the large general catalog, it furnishes a good idea of the variety of products made by this old concern.

Pages have been devoted to lists of articles especially for mills, railroads, automobiles, etc. The descriptions are brief, but the company will gladly send pamphlets dealing in detail with any of the individual members of the line.

This new catalog should be in the file of every purchasing agent, engineer, superintendent and others who have occasion to use lubricants, paint or pencils. Ask for Booklet No. 112-KP.

Aluminum Castings—The McAdamite Aluminum Company, of Detroit, Mich., has issued a most interesting catalog containing a series of photographs of the various departments of their extensive plant which is now devoted to the production of aluminum castings and products. The plant of this company has been so designed that all operations go along in continuous process with no back-stepping, waste time or effort, from unloading the pure ingots to the shipment of the finished casting. The principal product of this company is known as McAdamite aluminum, which is stated to have a tensile strength of 44,000 pounds per square inch, with a specific gravity of 3.20. Copies of this interesting catalog may be had upon request.

Buffing and Polishing Wheels is the title of a genuinely helpful pamphlet, Bulletin 200, just issued by A. P. Munning & Company, manufacturers of electro-plating and buffing apparatus and supplies, 50 Church street, New York.

In presenting this bulletin to the trade, the company has eliminated all gratuitous selling talk. Each class of buff and wheel is illustrated and explained and facts of real importance concerning each are given.

Special attention is called to "Hints to Buffers," which appear on pages 37-40 of the bulletin. A. P. Munning & Company desiring to be of all possible aid to buffers, include a discussion of methods of testing materials, setting up wheels and speeding up the work in the buffing room.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL STOCKS MARKET QUOTATIONS

New York, March 10, 1919.

	Par.	Bid.	Asked.
Aluminum Company of America.....	$100	$500	$600
American Brass	100	206	209
American Hardware Corp.....	100	134	138
Bristol Brass	25	...	27
International Silver, com.....	100	25	35
International Silver, pfd.....	100	85	92
New Jersey Zinc	100	234	238
Rome Brass & Copper.....	100	300	380
Scovill Manufacturing	100	340	360
Yale & Towne Mfg. Co.....	...	210	220

Corrected by J. K. Rice, Jr., & Co., 36 Wall street, New York.

METAL MARKET REVIEW

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

COPPER

The copper industry last month, made considerable progress in adjustment toward better conditions for normal business. Prices declined 2¾ to 3½c per pound on the different kinds of metal, for prompt delivery, to 16.50c for prime Lake, to 15.25c for electrolytic and to 15c for casting copper at the end of the month. April and May positions February 28th were nominally quoted at the same figures, with the exception of casting copper, which was held at 14.87½c to 15c per pound. Actual sales of refined copper during the month on both foreign and domestic account were estimated to have aggregated between 50 million and 60 million pounds, of which 20 million pounds were sold during the last week in February.

TIN

The tin market in February continued to be hampered by the Government restrictions placed upon it late in 1918 and which prohibit importations of metal except through one company—the largest consumer of tin—in this country, with the selling price fixed at 72.50c per pound for Straits metal. This price, early in February, was 18 to 20c per pound more than cost of importations at this time would have been to importers had such importations been permitted. At one time in the month importations could have been made as low as 46c per pound while on the last day of February, the cost to import was estimated at 48.75 to 49c per pound, delivered, New York. The only free market was in small lots of pure tin which declined from 68.75c February 1, to 68c on February 28. American 99 per cent tin was available at 67c early in the month and at 66c during the last week. A few parcels of Straits—less than 5 tons each—were obtainable in the outside market at 72c after February 5.

LEAD

Early in the month, the market was very quiet and a further reduction in the official base price of the American Smelting & followed with an advance to 5.15c East St. Louis, 5.35c New York, the outside market having already reached that level. Some buying developed after this and by the 20th, an advance to 4.85c East St. Louis, 5.10c New York was made by the leading producer, while in the outside market, quotations were ten points higher. On February 25th the "Trust" again advanced its base to 5c East St. Louis, 5.25c New York, and the outside market followed with an advance to 5.15c East St. Louis, 5.35c New York, these being the quotations on the last day of February. With further curtailment in output reported, the market was firm and the opinion was expressed by some in the trade that the bottom had been reached in prices and that improvement would speedily follow with an upward trend in prices.

SPELTER

The month opened with a decline in prices to 6.40c East St. Louis, 6.75c New York, for prompt shipment with a reduction of 5 points each on February, March and April positions. By February 7th an advance began, on the strength of considerable buying, which, however, proved to be of a speculative character, and which carried prices to 6.50c East St. Louis, 6.85c New York, by

the 10th for prompt, February and March shipments. With the cessation of this demand, prices were shaded and gradually declined to 6.27½c East St. Louis, 6.62½c New York on all shipments on the last day of the month.

ALUMINUM

Government maximum prices of aluminum, 33c per pound for virgin ingots, f. o. b. United States producing plants for 50-ton lots, expired by natural limitation March 1st, releasing the metal from all restrictions imposed by wartime necessity. Quotations in the outside market during February were 31-32c for 98-99 per cent virgin; 27-29c for 99-98 per cent remelted; 23-25c for No. 12 remelted, these being the same figures that prevailed in the latter part of January. Demand for the metal was reported as being very light throughout the month. There was a rumor in the trade that the Aluminum Company of America would continue the Government prices as their basis for sales, but it is not likely that large consumers will place contracts at these figures without protection against decline.

ANTIMONY

Demand for antimony during February was very light and prices continued to sag until the end, the decline being ½c per pound from 7.50c to 7.00-7.12½c for prompt wholesale lots, duty paid, while jobbing lots ranged from 7.12½c to 7.25c according to size.

SILVER

There was no change in the price of silver, $1.01⅛ during February. The curtailment in production of refined copper that is now under way will further affect current output of silver which is already below consumptive requirements. Silver in large quantities is produced as a by-product by many of the large copper producing companies. Shipments to India from the Philadelphia Mint in February, obtained from the melting of silver dollars, amounted to $15,000,000 making a total of $41,800,000 since January 1st, that have been shipped in the movement to India.

QUICKSILVER

The downward trend in prices of quicksilver was continued during February to $85 per flask registered on the 24th, making a total recession of $13 for the month. There was no further change thereafter. Production has been reduced to 40 per cent of previous operations.

PLATINUM

The demand for platinum during February was steady with quotations at $100 per ounce for pure, after the 18th, until the month closed.

OLD METALS

Until in the last few days of February complete dullness reigned in the old metals market with buyers and sellers alike awaiting some sign in the major metals to indicate returning activity. This came with the ¼c advance in the official quotations of the "Trust" price of lead during the last week and developed confidence with a feeling that not only had bottom prices been reached in lead at least, but that the turn had come indicating better business. Block tin pipe at the end of the month was up 3c to 50.00c; electrotype ⅜c to 4.50c; stereotype ⅝c to 5.50c. Declines registered were 1½c on strictly crucible copper to 13c; 1c on uncrucibled copper wire to 12c; ½c on light copper to 11c. New zinc was down ¾c to 5.25c and old scrap zinc ½c to 4.50c. Brass clippings were off 1c to 9c and brass turnings ¾c to 7.25c. The aluminums also weakened, old cast declining 2c to 16c and new aluminum 1c to 21c. Clean red car boxes were off 1c to 11.50c and cocks and faucets ½c to 11c.

WATERBURY AVERAGE

Lake Copper Average for 1918, 24.75. 1919—January, 23.00. February, 18.00.

Brass Mill Spelter. Average for 1918—9.858. 1919—January, 9.00. February, 8.20.

FEBRUARY MOVEMENTS IN METALS

Copper:	Highest	Lowest	Average
Lake	19.50	16.50	17.868
Electrolytic	18.50	15.25	16.908
Casting	17.75	15.00	16.454
Tin	*72.50	*72.50	*72.50
Lead	5.35	5.00	5.138
Spelter (brass special)	6.60	6.30	6.466
Antimony	7.37½	7.00	7.243
Aluminum	†33.10	31.50	32.258
Quicksilver (per flask)	$98.00	$85.00	$90.737
Silver (cts. per oz.)	101⅛	101⅛	101⅛

*Government maximum price.
†Government maximum price for carload lots.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. page.

Metal Prices, March 10, 1919

NEW METALS

	Cents.
Copper—Duty Free. Plate, Bar, Ingot and Old Copper.	
Manufactured 5 per centum.	
Eltrolytic, carload lots	14⅞
Lake, carload lots	15½
Casting, carload lots	14¾
Tin—Duty Free.	
Straits or Australian, carload lots	72½
Lead—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	5.25
Spelter—Duty 15%.	
Brass Special ..... nominal	6.67½
Prime Western, carload lots	6.55
Aluminum—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	....
100-lb., f. o. b. factory	....
Ton lots, f. o. b. factory.....Government price.	33.20

Antimony—Duty 10%.	
Cookson's, Hallet's or American	Nominal
Chinese, Japanese, Wah Chang WCC, brand spot	7⅞c
Nickel—Duty Ingot, 10%. Sheet, strip and wire, 20% ad valorem.	
Ingot	40c.
Shot	43c.
Electrolytic	45c.
Manganese Metal	Nominal
Magnesium Metal—Duty 20% ad valorem (100 lb. lots)	$1.90
Bismuth—Duty free ..... nominal	$3.50
Cadmium—Duty free ..... nominal	$1.50
Chromium Metal—Duty free ..... nominal	
Cobalt—97% pure	$3.00
Quicksilver—Duty 10% per flask of 75 pounds	$70.00
Platinum—Duty free, per ounce	$100.00
Silver—Government assay—Duty free, per ounce	$1.01⅛
Gold—Duty free, per ounce	$20.67